00056735

BOMBAY BRANCH
OF THE
ROYAL ASIATIC SOCIETY.
TOWN HALL, BOMBAY.

Digitized with financial assistance from the
Government of Maharashtra
on 05 October, 2018

FORT CONGER, GRINNELL LAND, MAY 30, 1883.

(From a photograph.)

THREE YEARS OF ARCTIC SERVICE

AN ACCOUNT OF THE

LADY FRANKLIN BAY EXPEDITION

OF 1881-84

AND THE ATTAINMENT OF THE

FARTHEST NORTH

56735

BY

ADOLPHUS W. GREELY

LIEUTENANT U. S. ARMY, COMMANDING THE EXPEDITION

WITH OVER ONE HUNDRED ILLUSTRATIONS MADE FROM PHOTOGRAPHS TAKEN BY THE PARTY, AND ORIGINAL DRAWINGS, AND WITH THE OFFICIAL MAPS AND CHARTS

VOL. II.

LONDON

RICHARD BENTLEY AND SON

Publishers in Ordinary to her Majesty the Queen

1886

[*All rights reserved*]

00056735

CONTENTS.—VOLUME II.

CHAPTER XXX.

PAGE

OUR SECOND WINTER, ... 1

CHAPTER XXXI.

NORTHWARD AGAIN, ... 16

CHAPTER XXXII.

THE CROSSING OF GRINNELL LAND, ... 27

CHAPTER XXXIII.

POLAR ICE, ... 43

CHAPTER XXXIV.

PREPARATIONS FOR RETREAT, ... 61

CHAPTER XXXV.

FROM CONGER TO CAPE BAIRD, ... 71

CHAPTER XXXVI.

KENNEDY CHANNEL, ... 78

CHAPTER XXXVII.

PAGE

RAWLINGS BAY TO CAPE HAWKS, ... 96

CHAPTER XXXVIII.

OUR BESETMENT, ... 107

CHAPTER XXXIX.

STRIVING FOR THE SHORE, ... 125

CHAPTER XL.

NEWS OF THE PROTEUS, ... 151

CHAPTER XLI.

GOING INTO WINTER QUARTERS, ... 165

CHAPTER XLII.

COLLECTING OUR SUPPLIES, ... 175

CHAPTER XLIII.

THE TRIP TO ISABELLA, ... 187

CHAPTER XLIV.

WINTER QUARTERS, ... 195

CHAPTER XLV.

WINTER QUARTERS.—(*Continued.*), ... 211

CHAPTER XLVI.

PAGE

PREPARATIONS TO CROSS SMITH SOUND, ... 235

CHAPTER XLVII.

NEW LANDS AND VARYING FORTUNES, ... 256

CHAPTER XLVIII.

THE BEGINNING OF THE END, ... 279

CHAPTER XLIX.

THE LAST OF OUR RATIONS, ... 301

CHAPTER L.

THE END—BY DEATH AND BY RESCUE, ... 312

CHAPTER LI.

CONCLUSION, ... 333

APPENDICES.

APPENDIX I.

MEANS OF THE METEOROLOGICAL OBSERVATIONS MADE AT FORT CONGER, GRINNELL LAND, 1881-1883, ... 340

APPENDIX II.

MEAN PRESSURES AND TEMPERATURES AT INTERNATIONAL STATIONS, 1882-1883, ... 344

APPENDIX III.

PAGE

MEAN AND MINIMUM TEMPERATURES AT VARIOUS POLAR STATIONS, ... 347

APPENDIX IV.

MAXIMUM THICKNESS OF SALT-WATER ICE OBSERVED AT VARIOUS POLAR STATIONS, ... 351

APPENDIX V.

RESULTS OF SOUND EXPERIMENT AT FORT CONGER, GRINNELL LAND, ... 352

APPENDIX VI.

ETHNOLOGY, ... 354

APPENDIX VII.

NATURAL HISTORY NOTES, ... 359

APPENDIX VIII.

ORNITHOLOGY, ... 372

APPENDIX IX.

BOTANY, ... 386

APPENDIX X.

MOSSES AND LICHENS, ... 392

APPENDIX XI.

REPORT ON THE MEDUSÆ COLLECTED BY THE LADY FRANKLIN BAY EXPEDITION, LIEUT. A. W. GREELY COMMANDING, ... 399

APPENDIX XII.

PAGE

ON SALMON CAUGHT IN LAKE ALEXANDRA, ... 409

APPENDIX XIII.

ACCOUNT OF AURORAL DISPLAYS ACCOMPANYING THE GREAT MAGNETIC STORM OF NOVEMBER 15-19, 1882, NOTED AT FORT CONGER, GRINNELL LAND, ... 410

APPENDIX XIV.

REPORT OF SERGEANT D. L. BRAINARD ON A PETRIFIED FOREST DISCOVERED MAY 20, 1883, NEAR CAPE BAIRD, . . . 419

APPENDIX XV.

REPORT OF SERGEANT HAMPDEN S. GARDINER ON THE FOSSILS COLLECTED AT CAPE CRACROFT, ... 421

APPENDIX XVI.

LIST OF GAME OBTAINED BY THE LADY FRANKLIN BAY EXPEDITION WITHIN THE ARCTIC CIRCLE, ... 424

LIST OF ILLUSTRATIONS.

VOLUME II.

FULL-PAGE ILLUSTRATIONS.

FORT CONGER, GRINNELL LAND, MAY 20, 1883. ..... *Frontispiece*
(*From a photograph.*)

Face Page

ESKIMO JENS RETURNING FROM SEAL HUNT..... 3

FAC-SIMILE OF SKETCHES MADE BY LIEUTENANT JAMES B. LOCKWOOD, ON HIS TRIP ACROSS GRINNELL LAND, APRIL—MAY, 1883..... 28

SEA FACE OF ICE-FOOT AT DISTANT CAPE..... 43
(*From a photograph.*)

A PALÆOCRYSTIC BLOCK, BREAKWATER POINT, LADY FRANKLIN BAY.. 51
(*From a photograph.*)

LAUNCH LADY GREELY IN DISCOVERY HARBOR, AUGUST, 1882..... 74
(*From a photograph.*)

NORTH SIDE OF CARL RITTER BAY—KENNEDY CHANNEL..... 78
(*From a photograph.*)

A WONDERFUL LEAD THROUGH A SPLIT FLOEBERG..... 84

A SERIOUS NIP..... 97

ENGLISH DEPOT AT CAPE HAWKS..... 107
(*From a photograph.*)

ABANDONING LAUNCH LADY GREELY, SEPTEMBER 10, 1883..... 125

Face Page

THE CRUSHING OF OUR FLOE, SEPTEMBER 26, 1883..... 146

LANDING AT ESKIMO POINT, SEPTEMBER 29, 1883..... 149

OUR HUNTER, SERGEANT FRANCIS LONG..... 175
(*From a photograph.*)

BRAINARD AND CHRISTIANSEN SUCCORING ELISON, LYNN, AND FREDERICK..... 190

INTERIOR OF OUR WINTER HUT AT CAMP CLAY, DURING COOKING, 1883. 207

OUR FIRST FUNERAL, JANUARY 20, 1884..... 225

LIFE BOAT COVE..... 236
(*From a photograph.*)

THE DEATH OF RICE—BAIRD INLET, APRIL, 1884..... 286

LONG AND JENS KILLING THE BEAR, APRIL 11, 1884..... 290

THE DEATH OF JENS..... 299

THE RESCUE, JUNE 23, 1884..... 331

RELIEF SQUADRON OF 1884, AT GODHAVN, GREENLAND..... 333
(*From a photograph.*)

ESKIMO PASTOR AT THE GRAVE OF CHRISTIANSEN, GODHAVN..... 336

ARCTIC HIGHLANDERS, SAUNDERS ISLAND NATIVES..... 354
(*From a photograph.*)

NAUPHANTA POLARIS (FEWKES)..... 399

ILLUSTRATIONS IN THE TEXT.

Page

CAPE WASHINGTON..... 1
(*Lockwood's Furthest North*, 1882.)

ELLA VALLEY GLACIER—SECTION OF FACE OF GLACIER..... 30

Page

FLOEBERG AT CAPE BAIRD SHOWING STRATIFICATION..... 50

(*From a Sketch by Sergeant Gardiner.*)

FLOEBERG, WITH MORAINES, IN KANE SEA, SEPTEMBER 8, 1883..... 53

PYRAMID FLOEBERG..... 54

(*From a Photograph.*)

PRESSED-UP FLOEBERG..... 60

(*From a Photograph.*)

SCHNEIDER HAULING ICE WITH PUPPY-TEAM..... 63

BESSELS BAY FROM CAPE CRACROFT..... 79

(*From a Sketch by Sergeant Gardiner.*)

LIEUTENANT F. F. KISLINGBURY..... 87

CAPE JOSEPH GOOD..... 94

(*From a Sketch by Sergeant Gardiner.*)

CAPE C. A. SCHOTT, AND NORTH SIDE OF DOBBIN BAY..... 104

(*From a Photograph taken at Cape Hawks in* 1881.)

VICTORIA HEAD, BEARING SOUTHWEST, SIX MILES DISTANT..... 114

(*From a Sketch by Sergeant Gardiner.*)

CAPES ALBERT AND CAMPERDOWN OF BACHE ISLAND, BEARING WEST, FOUR MILES DISTANT..... 123

(*From a Sketch by Sergeant Gardiner.*)

JENS, OUR WATER-SEEKER..... 126

BREVOORT ISLAND, OFF CAPE SABINE, JUNE, 1884..... 140

CAPE PARRY.—JUNE, 1884..... 152

(*From a Photograph.*)

PLAN OF WINTER QUARTERS AT CAMP CLAY..... 173

Page

OUR RECORDS AND INSTRUMENTS..... 179

(*Cached October*, 1883, *on Stalknecht Island.*)

SERGEANT JOSEPH ELISON..... 191

HOSPITAL STEWARD BIERDERBICK..... 229

AN ETAH NATIVE..... 233

(*From a Photograph by Relief Expedition.*)

SERGEANT GEORGE W. RICE, OUR PHOTOGRAPHER..... 282

SERGEANT JULIUS R. FREDERICK..... 284

SERGEANT DAVID L. BRAINARD..... 308

(*Sole Survivor of those who reached the Farthest North.*)

PRIVATE MAURICE CONNELL..... 330

THE ROCK PTARMIGAN..... 379

ARCTIC OWL..... 381

THE SNOW BUNTING..... 382

LIST OF MAPS.

Face Page

ROUTE OF SLEDGE EXPEDITION, MARCH 27 TO APRIL 12, 1883. BY J. B. LOCKWOOD, LIEUTENANT 23d INFANTRY U.S.A..... 20

DISCOVERIES MADE IN THE INTERIOR OF GRINNELL LAND, BY FIRST LIEUTENANT A. W. GREELY, U.S.A., APRIL, MAY, JUNE, AND JULY, 1882, AND BY LIEUTENANT J. B. LOCKWOOD, U.S.A., APRIL AND MAY, 1883..... 36

GRINNELL LAND—FROM DISCOVERIES MADE BY INGLEFIELD, KANE, HAYES, HALL, AND NARES.....*At End of Volume*

NORTH POLAR REGIONS—CHART OF THE ARCTIC OCEAN...*In Pocket at End of Volume.*

Cape Washington.
[*Lockwood's Farthest North*, 1882.]

CHAPTER XXX.

OUR SECOND WINTER.

IT is obvious that our second winter could hardly pass as pleasantly as the first. The novelty of Arctic service had passed with all, while the unvarying routine and wearisome monotony could not but more deeply depress the spirits of the men. The non-arrival of the visiting steamer not only in itself threw a gloom over the party, but it necessitated a restriction in the use of certain articles of food, and the feeling alone of being on allowance is irksome to many men. I had carefully preserved for the second year the regulation allowance of vegetables, flour, etc., but had used of these articles the entire margin allowed for wastage and loss, as well as the surplus resulting from the return of three men the preceding year. We had, however, hard bread, salt meats, butter, pickles, milk, eggs, fruits, molasses, tea,

and coffee in abundant quantities, as well as several tons of fresh meat. Notwithstanding this ample supply of food, the surgeon not only spoke discouragingly in his official report of the prospects of health for the expedition during the coming year, but also forgot himself to the extent of sending such a communication through the hands of an enlisted man, with whom, as well as with others, he discussed the situation. The dissatisfaction, if not the disaffection, that such a course would naturally cause had also to be counteracted.

The only method to pursue was to give unusual and extraordinary attention to all matters which could affect the health and spirits of the men. To this end personal and particular observation was had daily of the dryness of the beds, the proper preparation of the food, and the regularity of life on the part of the men. The diet was enlarged, as far as practicable, by experiments with new dishes, and an order was issued forbidding sleep during the day. The heating arrangements, which had been defective during the first year, were overhauled and materially improved. A large porch was added to the building, and the external walls of snow and ice were carried to the very roof. The advice of the surgeon was invited, and all medical recommendations were scrupulously followed as far as means and duty would permit. The result of these labors was dryer, warmer, and more comfortable quarters even than we had during the preceding year. The men passed the winter in better spirits and condition, and the surgeon admitted, in an official report the next spring, that their health was better during the second than the first winter.

The experiences of the second year need not be dwelt on at length, but I extract from my diary the most important items:

"September 2d.—Having given up the ship, I commenced

ESKIMO JENS RETURNING FROM SEAL HUNT.

to-day, putting our scientific reports in such condition that they can be readily transported in case of necessity next year."

"September 8th.—The lower harbor is yet open, owing partly to the fact that September to date has been 3° (1.7° C.) warmer than last year. Jens and Frederik have each killed a seal (*Phoca hispida*) within the past week."

"September 9th.—Jens shot a large, snowy owl." This was one of the last birds seen that year. On the same day Long released six owls which he had raised. They had inordinate appetites, and from the time they were caught, as young owlets, swallowed anything given them. I remember one bolting whole a sandpiper about half his own size. Over a hundred and fifty skuas (robber gulls) were killed and fed to these owls. It was interesting to note that, although they had never used their wings, the owls flew well. Two of them were awkward and heavy in flight, but another flew a long distance before alighting.

"September 11th.—I ordered the slaughter of the weakest musk-calf, which was failing; he dressed only forty-two pounds."

"September 16th.—Jens caught a fine, young fox, pure white, except a few black hairs in his tail. I have decided to keep him. Biederbick shot a fox the other day, but, neglecting to load his gun at once, lost him, as the fox was playing possum. He was much chagrined to have Reynard jump up and run, on his near approach."

"September 17th.—We hauled up the launch at Dutch Island, the spring tide being very high and conditions favorable. She lies broadside on, and is in a fairly safe location. Sergeant Israel skated down to assist in hauling her up, and broke through the young ice between Dutch and Breakwater Islands, and was rescued with some difficulty. He was quickly sent back to the station by dog-sledge, and suffered no harm from the accident."

"September 21st.—Temperature was down to 0.7° (—17.4° C.)

to-day, showing the approach of winter. It fell below zero (−17.8° C.) in 1881 one day earlier."

"September 22d.—Another fox caught alive by Jens. The one first caught is now quite tame, and does not much mind being handled. When stroked he makes a purring noise, not unlike that of a cat. He invariably jumps at one's face when it is brought near to him."

"September 24th.—Psalms were read at 10 A.M., after which Lieutenant Lockwood started out on a trip of four or five days with dog-sledge. He goes at his own request, with a desire to see whether he can reach Lake Heintzelman in Black Rock Vale by sledge." He returned three days later, convinced of the general impracticability of sledging to Lake Hazen overland, as the short trip wore through a steel runner. He found the ice on Lake Heintzelman a foot thick, and had a temperature of −4° (−20° C.) on the 25th, the lowest temperature noted in September that year. A musk-ox, dressing three hundred and seventy-one pounds, was killed three miles above the lake.

On the 28th Brainard shot a large, fine raven (our first and only one) weighing four and three-fourths pounds, and the day following Jens caught an ermine already in his winter fur.

"September 30th.—A bear visited the station last night, and carried off the musk-ox skeleton from a rock within a short distance of the house, but dropped it after carrying it a hundred yards; probably alarmed by the barking of the dogs. Many tracks are to be seen, and some are of the opinion that there are two or three bears, but Sergeant Brainard, by my orders, measured the tracks, and found them all to be of equal size, seven and a half by nine inches. Lieutenant Kislingbury and five others, with dog-team, followed the track some four or five miles, but lost it on the thin, smooth ice."

"October 1st.—New ice is now a foot thick, and the temper-

ature fell below zero (−17.8° C.) for the first time. Bear-tracks were seen to-day by Long. Lieutenant Lockwood and four others, with dog-sledge, were sent out to hunt him. They were gone two hours, and returned reporting that Jens and Brainard had seen the bear, and got within five hundred yards of him." The bear came again on the 3d, and its tracks indicated the same animal, the only one known at Conger. In consequence of these visits, I required the men to obtain authority for any extended absence from the station. In connection with this affair I was obliged to reduce Sergeant Lynn to the ranks for a disrespectful remark, the only blemish on Lynn's otherwise admirable record in his three years' service.

"October 6th.—The water around Distant Cape is frozen over, but not yet safe for travel. Connell tried to bring coal around it yesterday. One of the musk-calves died three days since, and I sent the others to Bellot Island to-day on dog-sledge. We tried, first, driving them over the ice, but were unable to do so. When they reached the island and one was untied, he died immediately. The other was taken up into the ravine, following Long like a dog, but, despite all efforts, the men were unable to leave him there; he ran after the sledge and returned to the station. After arriving near the house he followed Long everywhere, and was finally carried to his old pen." He died the next day, from what cause we could not ascertain.

"Oct. 9th.—The day is a perfect one, marked by a display of those delicate and indescribable tints which are peculiar to an Arctic sky. During a greater part of the day a solar halo, very bright and beautiful, presented itself. These wonderful beauties of sky and celestial phenomena are not, however, of such frequent occurrence as many Arctic narratives would lead one to suppose."

"Oct. 13th.—Yesterday an owl and a ptarmigan were seen. It

is possible the owl is one of our own." (This owl or another was seen on the 17th). "We killed one of the foxes this morning; he repeatedly broke his chain, and has continued as vicious as when caught, biting us at every opportunity. The one first captured, named Reuben, is quite tame. It is probable that he is a young animal and the other an old one. The three sledges returned this evening, bringing in eight hundred and forty pounds of meat. Most unfortunately foxes were able to enter the stone huts constructed in St. Patrick Valley, and half the meat has been eaten. At Cape Beechy an entire musk-ox was gone, which is charged to a bear, whose tracks were seen at several places pointing south." The rest of the meat, nearly a thousand pounds, was brought in by Sergeant Rice a few days later.

"Oct. 16th.—The temperature fell yesterday (permanently) below zero (—17.8° C.), sixteen days earlier than last year. The sun left us to-day for the winter, and was last seen on the 13th."

"Oct. 22d.—Psalms were read as usual at ten o'clock. Bender is the first man who has objected to the service, and was excused to-day, at his own request, on religious grounds. It is proper and essential that there should be an observance of the day, but I have rarely commented on what was read and have endeavored to avoid anything like sectarianism in my selections, having no wish to constrain the religious opinion of any man."

"Oct. 24th.—The first occultation yet obtained was made to-day. It was of delta piscium. Immersion 8 hours, 27 minutes and 9.10 seconds, by chronometer No. 198, which was fast of local siderial time 4 hours, 32 minutes, 24.7 seconds."

"Oct. 27th.—Dr. Pavy, at his expressed desire, was ordered to proceed to or beyond Carl Ritter Bay, and as much farther south as is possible, to examine the coast for any caches or signs of the expected relief vessel of this year; he is accom-

panied by Brainard and Jens, with dog-sledges. Before leaving, Dr. Pavy reported the party to be in health."

"Oct. 30th.—The sky at noon is now a bright brick-red, but is daily fading in light and beauty."

"Oct. 31st.—Temperature very high, −6° (−21.1° C.)."

"November 3d.—Schneider had the fox outside the house today; Reuben was much alarmed at the dogs, who displayed a lively interest in him, and seemed to appeal to his master for protection, and to be very glad to return to confinement."

"Nov. 5th.—Psalms were read at 10 A.M. The temperature fell sharply last night, and is now at −30° (−34.4° C.). The sky at noon, quite clear to the south, was very bright at the horizon. Our quiet November 5th contrasts strikingly with the noisy amusements of the English at this point in 1875. Dr. Pavy and Brainard arrived this evening, leaving Cape Baird at six this morning. Dr. Pavy's private dog died during the trip. The team returns in quite an exhausted condition, the trip having evidently been a very severe one for them. The party travelled only as far as Carl Ritter Bay. Going overland from Cape Baird, they struck the coast at Cape Defosse, and when five miles south of that cape, while travelling over the new ice, the sledge broke through. The travelling was fair along the coast, though the ice was in motion, being moved by the tides up and down Kennedy Channel, which was evidently open. Southeast of Carl Ritter Bay water-clouds were seen for some distance, but to the south there was an ice-blink. A hare was seen on October 28th, a musk-ox killed on November 1st, and another was seen a few days before, near Cape Defosse. In pursuit of the former Brainard discovered on a low bench a circle of stones, ten feet in diameter, indicating the site of an ancient Eskimo encampment. Snow covering the ground prevented him from farther examining the place. The divide of Judge Daly Peninsula between

the head of Pavy River and Defosse Valley is but four hundred and twenty feet above the sea by barometrical measurement."

"Nov. 9th.—Including to-day, the mean for November has been −23.4° (−30.8° C.), being 11° (6.1° C.) below a similar period for last November, which was the coldest on record. Frozen mercury was noted for the first time this winter."

"Nov. 12th.—The southern sky at noon has changed in shade from brick-red to dull yellow. The temperature rose 1.67° (9.3° C.) in one hour, and fell 16.4° (9.1° C.) the following."

"Nov. 14th.—Ralston was dazzled at 1 A.M. by a brilliant meteor in the southwest. A long trail of white light of exceeding intensity, about 20° in length, was at first observed, which changed gradually to a brick-red in color. He momentarily expected it to disappear, but after watching it two or three minutes he called the astronomer, Sergeant Israel, from the house to locate it exactly. When seen by Israel, it extended from the northern point of lambda Arietis to the northern point of the Hyades. Its path was horizontal with the horizon. A light blue meteor of ten seconds' flight, with no report, was observed in the north on the 9th."

From November 14th to 19th the wonderful magnetic storm which was general throughout the world prevailed at Fort Conger, perhaps with greater intensity than at any other point. The auroral displays were magnificent on those days, and are imperfectly recorded in an appendix. The storm culminated on the 17th, on which date the magnetic needle ranged in variation considerably over 19°, and a brilliant aurora was visible continuously for nine hours.

At 8.35 A.M., November 16th, Göttingen mean time, the magnetic variation was 92° 51.6′ W., being the lowest reading of our series. On the day following, at 10.20 P.M. (G. M. T.), the

largest magnetic variation was noted, 113° 19.8′ W., a change to the westward of 20° 28.2′ in thirty-eight hours.

"Nov. 20th.—Jens trapped a fox yesterday, and to-day he wounded a seal (*Phoca hispida*), which has been seen several times in the tide-hole by Rice." The day following Jens shot the seal, which proved to be a baby, weighing only twenty pounds.

"Nov. 24th.—The men are meeting the winter much more cheerfully than last year, and have much better appetite. I lectured this evening on the aurora. Israel, at 9 P.M., tested the light of the full moon by a grease-spot photometer; it was found to equal the light of an adamantine candle at a distance of forty-nine and a half inches. At 10 P.M. the thermometers in the inner shelter were observed by it, and diamond print was read with ease. It seems to me that I have never known it to give so much light before."

"Nov. 25th.—At 11.50 A.M. a bright red meteor was observed, which at first appeared due north, at an elevation of 10°. It burst just above the horizon; no detonation was heard, nor trail seen; time of flight about ten seconds."

"Nov. 26th.—Fresh hare-tracks were seen near Proteus Point. He must be having hard times during this Arctic night with its extreme cold."

November 30th was celebrated as Thanksgiving Day, which was appointed by the following order:

"Thursday, November 30, 1882, being without doubt the appointed day of national thanksgiving, is herewith designated as a day of thanksgiving and praise. Exemption from death and disease, success in scientific and geographical work, together with the present possession of health and cheerfulness, may be mentioned as special mercies for which this command has reason to be devoutly thankful."

Target-shooting for prizes and an excellent dinner were the

features of the day. The shooting was done by moonlight at fifty yards' distance.

On December 3d a wolf was heard near the station, and at Dutch Island on the 9th, while ermine-tracks were seen on the 5th.

"Dec. 4th.—The men so far have shown no gloom or despondency, and are pictures of health. Sergeant Brainard, the orderly-sergeant, exercises his ingenuity to moderately exercise those disinclined to walk."

"Dec. 8th.—We have had a bit of the Greenland *foehn*. The barometer rose a quarter of an inch during the day. About 10 A.M. slight puffs came from the south; much wind to the southwest an hour later, followed by strong occasional puffs. At 12 M. it was found that the temperature had risen 13° (7.2° C.) in the hour."

"December 11th.—Lieutenant Lockwood had an unfortunate experience with one of the dogs to-day. He left the lantern and original record near the temperature-shelter while he went to make his magnetic observations. On his return he found that the dog, attracted perhaps by the odor of grease about the cover, had bitten out a third part of many pages, and apparently swallowed the paper. One of the dogs, a short time since, grabbed a large dish-rag that was thrown out with the water, and bolted it at once."

"December 12th.—The tame fox, Reuben, so long an inmate of the lean-to, concluded to leave, and so has dug himself a hole in the snow-wall which surrounds the house. He shows his nose occasionally, but is evidently unwilling to return. The dogs discovered him in the snow-wall and have been digging for him. He has become tame and allows handling, though reluctantly, without any attempt at biting unless provoked. He has amused himself for a long time by caching supplies of extra

meat. He was out once near the dogs, and a one-month puppy coming up, the fox caught him by the nose and sent him away yelping. He seemed lately to have but little fear of the dogs."

"December 15th.—Dr. Pavy delivered an interesting lecture on Napoleon."

"December 22d.—The electrical self-registering tide-gauge commenced working this afternoon, recording every five inches' rise of the tide. We lost an occultation this evening through cloudiness. We have been very unfortunate in that respect. This was a three-and-a-half-magnitude star, and was visible ten minutes before its occultating time. Brainard and Whisler visited Cairn Hill to expose a maximum thermometer. Hare-tracks were seen on the hill and an ermine-track near the station. It was quite calm at the station, but the wind was blowing fourteen miles an hour on the hill."

"December 31st.—The temperature is again below −30° (−34° C.), with calm weather, which makes it very comfortable. Psalms read and inspection as usual. The beds were all dry and everyone in good health. Over a pound of fresh meat has been eaten daily during December, and since October 1st the consumption has averaged a pound and a tenth daily."

"January 1st.—The men watched the Old Year out and the New Year in. Schneider placed on the game rack, where it was visible to everyone leaving the house, an illuminated placard wishing everybody a 'Happy New Year.' A small quantity of rum, two ounces to a man, was issued this evening."

"Jan. 4th.—One of my curtains was set on fire by Henry's carelessness to-day. Fortunately Lieutenant Lockwood pulled them down and prevented any serious damage."

"Jan. 5th.—The southern sky, at noon, was free from clouds, and presented to our view a creamy yellowish tint which was mixed with a mere suspicion of crimson. The appetites of the

few men who had in a measure lost them have commenced to improve. Biederbick has a faint touch of rheumatism. I caught the fox this evening, but did not stroke him, as I was without gloves and he was much excited over his new imprisonment."

"Jan. 7th.—Read Psalms at 9 A.M. Ordered Cross to examine the launch to-day, as the ice changed somewhat during the last storm. The stern-post was found somewhat injured by the last heavy tide, which had forced the ice-foot against her." It was impossible to do anything but occasionally cut out the ice pushed up around her, which was done regularly. The injury proved unimportant, and was easily repaired the following spring.

"Jan. 11th.—We have the new moon again, which contributes in no small degree to the brightness of our days. The dark season is at an end, although occasional cloudy days may necessarily be darker than to-day. The doctor prescribes an extra allowance of fresh meat for Biederbick and Jens. The former has rheumatism, and the latter seems well, but has a small appetite. This is the only special diet the doctor has yet prescribed. I read a number of extracts, mainly poetical, to the men this evening. Yesterday our last lamp-chimney broke, and we resort now to broken stubs, bottles, etc."

"Jan. 12th.—Ermine and fox tracks seen to-day on Cairn Hill, proving that these animals do not hibernate."

"Jan. 15th.—Temperature −50° (−45.6° C.), the lowest of the winter to date."

"January 20th.—Cross' thirty-ninth birthday, which was celebrated as usual, though he himself refrained from drinking any spirituous liquors, a reform which I trust he will continue. The harbor-floe is fifty-one inches thick."

"25th.— Brainard and Christiansen visited Cairn Hill to read the thermometers. The tracks of several ermine, a fox, and hare were observed. A few days since a place was seen where

a hare had dug through the snow to the ground, evidently for food. The Greenland coast was quite plainly visible, particularly in the neighborhood of Polaris Promontory."

"February 1st.—On the surgeon's recommendation, a small quantity of extra fresh meat is now issued daily to Long."

"Feb. 7th.—The distance which the harbor-ice has moved since we commenced reading tide-gauge No. 6 was measured to-day. The direct distance has been twelve and one-half feet, but, calculated as irregularly crossed, it must have moved twenty feet. The resultant direction is toward the south-southwest, *i.e.*, off shore. But few stars, and those of the first and second magnitude, could be seen at noon to-day."

"Feb. 8th.—The thermometers in the instrument-shelter were read for three hours without light to-day. From 10 A.M. to noon the spirit thermometer indicated temperatures from 0.6° to 0.8° above freezing mercury, but the mercurial thermometer remained frozen. It thawed out only at 2 P.M., having been frozen eight days and three hours. It is quite a coincidence that the lowest spell of frozen mercury commenced on the same day, January 31, in 1882 and 1883. The lowest temperatures of the two winters have been upon the same day, February 4th."

"Feb. 9th.—Millitook's puppy met with a misfortune this morning. Frederik brought him in gasping and nearly dead; his tail was frozen as stiff as a poker, and even meat could not tempt him. When an Eskimo dog cannot eat he is in a bad way. His tail was thawed out in cold water and he finally recovered. The puppy has been wandering around alone at these very low temperatures, and it is a surprise to me that he has not died. The men have named him General Grant for his persistency. Christiansen killed a hare. Barometer touched 29.109 to-day."

"Feb. 11th.—The ice is substantially stationary in freezing,

having increased but three-fourths of an inch in the past ten days, being now fifty-three inches thick. Long is fit for duty, but still has meat diet; it has also been ordered for Bender. The rest of the party is in health."

"Feb. 12th.—Connell chained and staked out two miles on the road toward Cape Beechy. The second mile-stake is about three hundred yards beyond Dutch Island. Lieutenant Lockwood, with Christiansen, took a load of provisions toward Cape Baird. The dogs made the two miles in returning, without load, in twenty minutes. The second mile-stake, a distance slightly over two miles from the house, was reached in going out, with load, in twenty-four minutes."

"St. Valentine's Day.—Sudden and unusual changes of temperature, accompanied by light winds from easterly quarters: 10 A.M., −45.2° (−42.9° C.); 11 A.M., −32.9° (−36.1° C.); 11.15 A.M., −41.6° (−40.9° C.); being a rise of 12.3° (6.8 C.) in an hour, and a fall of 8.7° (4.8° C.) in fifteen minutes. Neither the exposed mercurial or the delicate mercurial hygrometer thermometers thawed out."

"Feb. 19th.—Connell visited Cairn Hill to read the instruments. It seemed from the hill as though a storm must be prevailing to the northeast; the barometer is remarkably low, but steady. It has not been above 29.06 to-day, and touched, at 1 P.M., 28.968—the lowest yet recorded by us. It was read every half hour so as to catch the lowest point. The temperature rose slowly from −39° (−39.4° C.) to −26° (−32.2° C.), but no wind was experienced. The southwest window in the men's room was opened to-day at their request."

"Feb. 22d.—It being Washington's Birthday, all work, except that absolutely necessary, was suspended, and a small quantity of rum issued in the evening."

"Feb. 25th.—I read Psalms as usual. The sun should have

risen, astronomically, to-day, or at least the upper limb of it, but it was not visible."

"Feb. 28th.—The temperature unusually low to-day, the mean being the lowest so far for the winter months, −51.2° (−46.2° C.). The minimum, −56.5° (−49.2° C.), occurred last night. It only reached −55.7° (−48.7° C.) to-day for the minimum, and −45.6° (−43.1° C.) for the maximum. Sound experiments were made at −54.0° (−47.8° C.). Six hundred and thirty pounds of fresh meat have been consumed during the month, making nine-tenths of a pound daily per man. We have sixteen hundred and sixteen pounds on hand."

"March 1st.—The first day of spring brings a sense of relief that the second winter is over, and that the entire party is in perfect health. The unfavorable experiences of other expeditions, the forebodings of my surgeon, and the knowledge that no party had ever passed a second winter in such high latitudes, all combined, caused me much uneasiness, which has been a great mental trial during the past winter. Perfect ease of mind cannot come until a ship is again seen. Spring sledging on the Greenland side is looked forward to with some dread, and I shall feel insecure until Lieutenant Lockwood and his party are again safe on the Grinnell Land coast."

The second winter had now passed, and spring found us with health and spirits unimpaired. The three men, who for a few days had been allowed a special amount of fresh meat, speedily returned to their normal diet. With the coming sun all looked forward to a brief period of spring sledging, to be followed, as we hoped, by a relieving vessel; or, as we feared, by a retreat southward with our boats.

CHAPTER XXXI.

NORTHWARD AGAIN.

WITH the spring open and the sun returned, hunting was commenced with great energy, but with scanty results. Lieutenant Kislingbury succeeded, on March 3d, in shooting an ermine in his snowy suit, who had wintered in the commissary pile, and six days later shot a fine hare, which dressed nearly eleven pounds.

The main spring work was to be a renewal of explorations in North Greenland, and with that view every attention had been paid to our dogs and their condition. A number of the dogs were shot, as they were too old for work and our supply of dog-food limited. My journal says: "We are now better off for dogs than on our arrival; having twenty which can be depended on for long sledge journeys, and nine others which are fit for short trips. Our dogs have been fed regularly every other day, and, in addition, have been given daily the leavings of the table. The Polaris people, according to the report, fed theirs only twice a week. It is not to be wondered that they were savage and wolfish. Our dogs have not been as well fed as I could desire, as I have no food this winter but pork, beef, and fish (all salt). Their food has always been thoroughly soaked and freshened, and, what I consider an important point, always fed to them in an unfrozen and generally warm condition. Hard bread has been given to as many as would eat it, which includes the puppies raised here and one or two of the

old dogs. Most of the Greenland dogs will not touch bread, even when very hungry. Of the fifteen puppies born in Grinnell Land, which are now fit for work, five were from one bitch and seven from another. There is a great difference in the manner in which the bitches care for their young."

Lieutenant Lockwood left for his preliminary journey on March 10th, and was absent seven days. He was accompanied by Sergeants Brainard, Jewell, and Elison, and the two Eskimos, with their dog-teams. He succeeded in laying out a practicable sledge route from Cape Beechy to Cape Sumner, and in accumulating near the latter point about thirteen hundred pounds of field supplies. This preliminary work was performed in the most satisfactory manner, and without accident or suffering apart from the great discomforts that are necessarily experienced in sledging in very low temperatures.

Sergeant Elison, however, was taken sick the first day out, but, feeling better the next morning he continued on until the 13th. Lieutenant Lockwood then sent him back by sledge to Depot "B," near Cape Beechy, from which point, as he had recovered strength, he persuaded Sergeant Jewell to permit him to return on foot to Fort Conger. The pluck, endurance, and courage displayed by Elison on this occasion were only in keeping with the manner in which he performed all field service in connection with the expedition.

Sergeant Jewell remained in the field one day after Lieutenant Lockwood's return to perform certain field work. An accident occurred to his party at Depot "B," which delayed his return several hours, and might, under other circumstances, have proved a very serious matter. Instead of securing the dog-harness and whip in their own tent, they placed them in the depot. During the night the dogs broke in, stole and ate the harness and whip, which fortunately could be replaced from leather

cached at that point. The absolute safety of anything which a dog can eat is to be secured in the field only by keeping it under one's head or body.

Lieutenant Lockwood started on his final journey March 27th. His principal instructions read: "Except from unforeseen delays, you will be at Polaris Boat Camp not later than May 31st. Should any of the following contingencies arise, you will return immediately to this station: if you at any time think you cannot go beyond your farthest of 1882; if the polar pack shows signs of disintegration; if you are personally incapacitated for rapid travel; if any member of your party is badly injured. . . . The dangers attendant on your trip are obvious and serious. While reposing great confidence in your judgment and discretion, I cannot refrain from cautioning you against more risks than can possibly be avoided." Other clauses provided for further contingencies, and informed him what aid he could expect from the station in case of disaster.

The party consisted of Brainard, Jewell, Ellis, and the Eskimo, with two fine teams of ten strong dogs each. They were carefully and thoroughly fitted out, the equipment being much superior to that of the preceding year. The ration was increased, and half the meat was frozen musk-ox. The sledges were of the new pattern, and were provided with extra interchangeable parts. The cooking and sleeping gear was in excellent condition, and was so arranged that one, two, or three men could travel, or be safely left alone.

The plan contemplated the return of Jewell's sledge by April 23d, and that Lieutenant Lockwood himself should turn back from the north by May 19th, and reach the Grinnell Land coast by June 1st. Experience has shown that no party can safely *advance* in Arctic travel later than the last days of May. The *constant* weights of the advance sledge were reduced to

three hundred and twelve pounds, and of the supporting party to two hundred and eighty pounds.

The dogs averaged seventy pounds each in weight, and on leaving Polaris Boat Camp were to haul twenty-one hundred pounds. This weight was decided on after careful experiment, by which I determined that our teams could start on a long journey hauling one hundred and fifty per cent. of their own weight. The Hudson Bay rule of a hundred pounds to the dog is slightly under this. Experiments made over a measured course demonstrated that our dogs could rarely travel over six miles an hour with a light load, and half that distance with a heavy one.

On April 2d my journal says: "The mean temperature for March has been abnormal. The mean of the last seventeen days was —10.1° (—23.4° C.), by far the highest known in this part of the Arctic regions. It is very probable that there is open water again in the Polar Sea, and perhaps in Smith Sound. The high temperatures gave me much uneasiness, which the present cold snap has removed, about Lieutenant Lockwood's progress north, and caused me to insert the clause in his orders about the breaking up of the polar pack."

Lieutenant Lockwood surprised me by returning on April 12th. His party was in excellent condition, but open water, and the disintegration of the polar pack near Black Horn Cliffs, compelled them to turn back. The value of one year's Arctic experience, and of careful attention to equipment, was shown by this trip. The rapidity of the journey was extraordinary, and they reached Black Horn Cliffs from Conger in six days, against *twenty-two* days in 1882. They hauled from Cape Sumner twenty-two hundred pounds, and arrived at the cliffs on April 1st, *twenty-four* days earlier than in the preceding year. They had at that camp forty-one days' full rations for the advancing party, and seventeen for the supporting sledge. Lieu-

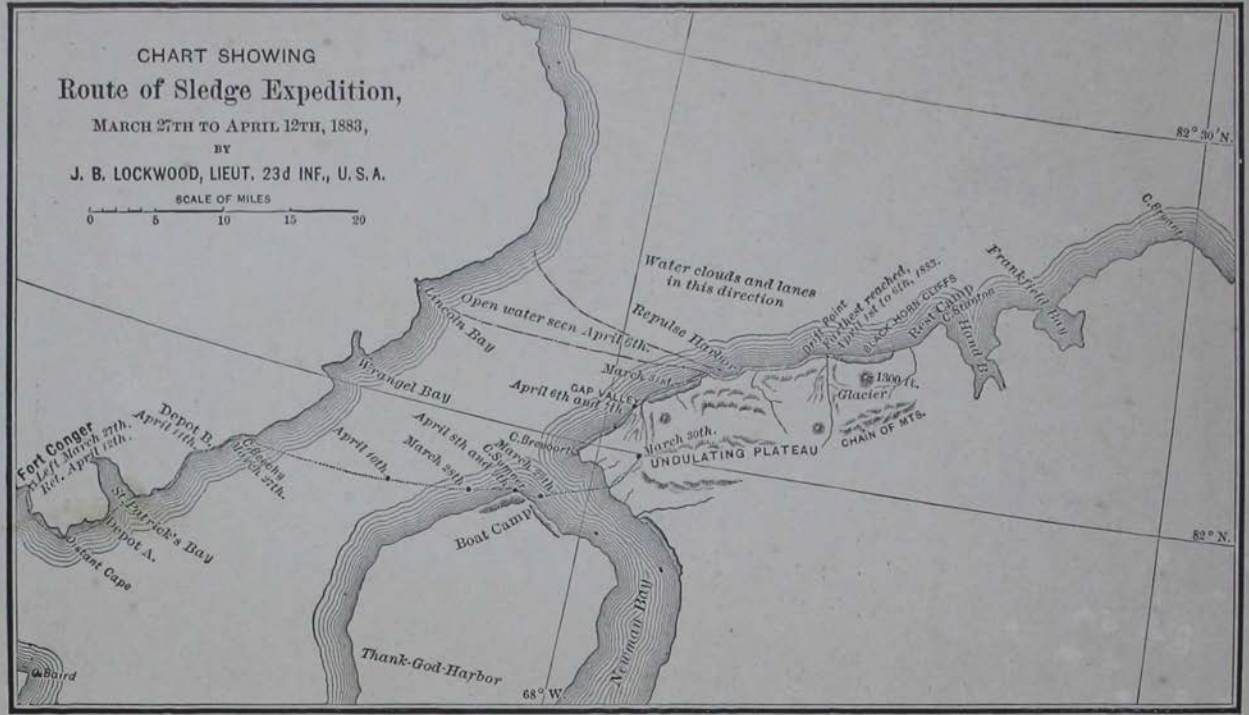


CHART SHOWING
Route of Sledge Expedition,
MARCH 27TH TO APRIL 12TH, 1883,
BY
J. B. LOCKWOOD, LIEUT. 23d INF., U. S. A.
SCALE OF MILES
0 5 10 15 20
82° 30' N.
82° N.
68° W.
Water clouds and lanes in this direction
Open water seen April 6th.
Lincoln Bay
Repulse Harbor
Wrangel Bay
Drift Point
Farthest reached, April 1st to 6th, 1883.
BLACK-HORN CLIFFS
Rest Camp
C. Stanton
Hand B.
Frankfield Bay
C. Bryant
March 31st.
GAP VALLEY
April 6th and 7th.
1300 ft.
Glacier
CHAIN OF MTS.
March 30th.
UNDULATING PLATEAU
C. Brewoort
C. Summer
March 29th.
April 8th and 9th.
April 10th.
March 28th.
Boat Camp
Newman Bay
Thank-God-Harbor
Fort Conger
Left March 27th.
Ret. April 12th.
Depot B.
April 11th.
C. Beechy
March 27th.
St. Patrick's Bay
Depot A.
Distant Cape
C. Baird

tenant Lockwood was then looking forward to reaching either the northern end of Greenland or latitude 85°, and with good reason. Should he travel even as slowly as in 1881, he would yet have seventeen days to the northward of Lockwood Island.

Unfortunately this was a bad year for our contemplated work —as well as for the opposers of an open Polar Sea. "On our arrival at Drift Point," says Lieutenant Lockwood, "there was seen a continuous belt of young ice a hundred yards and more wide between the polar pack and the shore, with many water-holes and small cracks in it. Thick water-clouds were visible to the north." A seal (*Phoca hispida*) appeared in the open water.

The next morning a stone would go through the ice almost anywhere, and the space of open water along shore was continuous. To pass around the edge of Black Horn Cliffs was impossible, owing to their precipitous bases being washed by the open sea. With great exertions Lieutenant Lockwood, in reconnoitring, reached the summit of the cliffs, thirteen hundred feet above the sea, being obliged to cut steps up the face of a sloping glacier discovered by Brainard, but it was impracticable to get the sledges over this point.

Of the open water Lieutenant Lockwood's report says: "One clearly defined lead ran northwest toward Cape Joseph Henry. Misty clouds obscured the entire northern horizon." While waiting at Black Horn Cliffs the temperature fell to —41° (—40.6° C.). Ice formed around the cliffs sufficiently strong to bear the sledges, and on the morning of April 4th an attempt was made to pass over it with light loads. The entire polar pack suddenly set off to the northward, and Lieutenant Lockwood says "two or three of the dogs went into the water, and I suddenly perceived that the ice was moving off shore."

Lieutenant Lockwood, ignoring the danger to himself, ordered Christiansen to find his way to land and ran after Sergeant

Brainard, who was a few hundred yards ahead picking out a road. The Eskimo, however, was equally as brave and self-sacrificing, for, lashing his dogs to a gallop, he overtook Brainard. By this time the pack had moved out so that a lane of water several yards wide separated them from shore, except a small floe, which, breaking and twisting, jammed between the main floe and a projecting and fortunately grounded floeberg. The main polar pack moved slowly to the northeast, so that they were able to hold the small floe against the grounded ice until, one by one, dogs, men, and baggage were hauled up over its edge. "Soon," says Lieutenant Lockwood, "there was a belt of open water a hundred yards and more along shore, and in two hours the main ice had moved two hundred yards to the east." The movement was general, as the corresponding motion of floebergs off shore indicated.

Lieutenant Lockwood turned homeward, and from high land near Drift Point, on April 6th, had an excellent view of the scene. He says: "The pack was separated from the shore east and west, as far as eye could reach, by open water perfectly free from ice and from two hundred yards to a half mile wide. In the direction of Lincoln Bay it expanded into a broad sea from three to five miles wide. . . . I looked at it attentively through the field-glasses, and it apparently extended across the straits (Robeson Channel). The polar pack was moving rapidly toward the east, as was plainly apparent by aligning any part of it with an object on shore. To the north several large leads of water were seen in the distance and smaller lanes near by. Dark, misty clouds hung about the northern horizon."

It is perhaps well for me here to put forth my views as to the physical conditions which exist to the northward of Greenland and Grinnell Land. In doing so I claim for them no special value nor scientific merit, as they are entirely personal and

theoretical. I doubt not that in the vicinity of the North and South Poles are glacial lands entirely covered by ice-caps of enormous thickness, which throw off the huge floebergs of the north and the yet more remarkable flat-topped icebergs of the south. The north polar land is, I believe, of limited extent, and its shores, or the edges of its glaciers, are washed by a sea which, from its size and consequent high temperature, its ceaseless tides and strong currents, can never be entirely ice-clad. Nordenskjöld believes in the open sea, convinced by the polar pack setting northward from Mussel Bay in 1872. Nares even would seem to be uncertain on this point, else he never would have equipped Commander Markham with the heavy boats hauled by his party in 1876. The wise discretion of Nares is evidenced by Pavy's experience in 1882, and this of Lockwood in 1883. That the Tegetthoff and Jeannette drifted northward winter as well as summer is confirmatory evidence of an "open polar sea." Far be it from me to advocate a navigable polar sea. On the contrary, I am firmly possessed with the idea that an ice-belt from fifty to a hundred miles wide borders the lands to the southward, and that the water-space to the northward can only be entered in extremely favorable years by the Spitzbergen route.

In the vicinity of Repulse Harbor, in 1883, Lieutenant Lockwood examined a floeberg, which was about forty feet high, with reference to stratification. He counted a dozen parallel and clearly defined strata from the top half way down.

At Repulse Harbor Lieutenant Lockwood recovered the union jack, sextant, etc., abandoned by Lieutenant Beaumont, R.N., in 1876, under the desperate circumstances narrated in a preceding chapter.

Since my return I have had the pleasure of transmitting to the British Admiralty this national ensign, which is so closely identified with one of the displays of heroic endurance and

devotion to duty which have been so frequently exhibited by officers of her majesty's service.*

This Greenland journey was by no means fruitless. Sergeant Jewell made a series of valuable tidal readings at Black Horn Cliffs, Repulse Harbor, and Cape Sumner, which must be of marked assistance in enabling experts to determine the co-tidal lines of the polar ocean and Robeson Channel. Lieutenant Lockwood complimented Sergeant Jewell on the ingenuity, fidelity, and perseverance exhibited in this work.

In order to supplement the tidal readings brought back by Sergeant Jewell, I sent him in charge of a party to Cape Beechy, on May 6th, while a second party went to Cape Baird under Sergeant Gardiner. These parties made a series of tidal

---

* Since the above account was put in type, I have received the following letter, conveying to me the thanks of the British Government for my action in this matter:

BRITISH LEGATION,
WASHINGTON, September 17th, 1885.

HON. T. F. BAYARD.

Sir: With reference to your note of the 20th of July last, forwarding the Union Jack abandoned by Captain Beaumont in 1876, and recently recovered by Lieutenant Greely's exploring party, for presentation to Her Majesty's Government, and with reference to my note of July 21st, I have the honor, in pursuance of instructions from the Marquis of Salisbury, to acknowledge the receipt of the Flag on behalf of the Lords of the Admiralty, and to express their high appreciation of the action of the United States Government in this matter, and to inform you that the Flag will be sent to the Naval Museum of Greenwich with an explanation of the circumstances connected with it.

Their lordships further desire that their thanks may be conveyed to Lieutenant Greely for bringing the Flag at a time when he was surrounded with great difficulties and danger.

I have the honor to be, with the highest consideration,

Sir, your obedient servant,

L. L. SACKVILLE WEST.

readings in connection with those made at Conger. Later in the month other tidal readings were made at Capes Beechy, Baird, Distant, and Craycroft, and Dutch Island.

In addition to his other work, Jewell determined the position of Cape Beechy to be 81° 52.5′ N., and to be 7 minutes 22.3 seconds east of Conger in time. Sergeant Israel determined the latitude of Cape Baird to be 81° 32′ 27.7″ N. (possible error + 0.9″), and the longitude 57.5 seconds (in time) east of Fort Conger. This determination fixes the latitude of Cape Lieber at 81° 28′ N.

During the journey to Craycroft Sergeant Gardiner made a special examination and fine collection of the fossils at that point, and Brainard discovered a fossil forest near Cape Baird, where one tree, over a foot in diameter, was found by him at an elevation of eight hundred feet above the sea.

April proved to be an exceedingly cold month, the mean being but slightly higher than that of March; a minimum of −37.3° (−38.5° C.) was noted, and the temperature did not rise above zero (−17.8° C.) until the 27th, except one observation. The snow-bird came ten days later than the preceding year, and the owl was still more tardy. We were so unfortunate in May as to lose three hundred pounds of fresh meat, which became tainted in its interior, although perfectly good externally. This was partly made up by three musk-cattle killed by Connell, who was an excellent and fortunate hunter, in Black Rock Vale, where I had sent him hunting with Jens. These cattle were killed thirty-five miles from the station, and Connell is entitled to much credit for his persistency and energy in hunting during the violent storm which prevailed most of the time that he was absent. The men's health remained good, although a number who abstained from fresh seal-meat were hardly as robust as the others.

May was an exceedingly cold month, and the severity of the weather can be estimated from the statement that the temperature was above 32° (0° C.) but one hour during the month. The thickness of ice on the first day of summer (54.4 inches) was not a cheerful indication of warm weather and favorable navigation.

The first flower, however, came on June 4th, only three days late, and the geese and ducks followed successively in the next two days. The second summer passed much the same as the first, save there was an increased interest in botanical and other specimens, and a greater anxiety as to the coming of our vessel.

CHAPTER XXXII.

THE CROSSING OF GRINNELL LAND.

ON his return from Black Horn Cliffs, Lieutenant Lockwood was extremely anxious to renew the attempt northward. After thoroughly considering the situation, I decided against its advisability. I should have sent him north again if the coming of the vessel had been a certainty, or another winter in Conger had been in prospect. As it was, I concluded to order him across Grinnell Land to the western ocean by the way of Archer Fiord, a trip which I had contemplated making myself on the return of Jewell's supporting sledge. Dogs, rations, and sledging outfit were already in perfect condition, and it needed only the order, which was issued on April 24th.

Lieutenant Lockwood left the following day, with Sergeant Brainard and Christiansen, the latter driving a team of our best ten dogs. They had provisions which would permit them to be absent thirty-one days from Sun Bay. In addition to their usual sledging-gear, they took a small hand-sledge, a dog-tent, and two knapsacks, to provide against all possible contingencies of land travel. A supporting sledge, under Sergeant Elison and Eskimo Jens, was directed to accompany them for two marches.

Lieutenant Lockwood on leaving was of the opinion that the feasibility of crossing Grinnell Land was exceedingly remote, and requested that he be allowed to visit Lake Hazen if his persistent efforts should fail in the route designated by me. His

report says: "I hardly expected to get farther than the head of Archer Fiord with the large sledge, or to be able to proceed many days beyond with the small one."

Deep, soft snow made travel difficult across Discovery Harbor, but they passed the depot at Sun Bay and made their first camp at Stony Cape. Travel improved the second day and they marched to a point six miles southward of Hillock Depot. Of the cache left at that depot by Lieutenant Archer, part had been eaten by foxes, but the rations found in metallic cases and rubber boxes were taken with them. Ptarmigan, hare, and fox tracks were observed, and a seal-hole at the entrance of Chandler Fiord.

At camp No. 2, two days' rations were cached for their return.

The third march took them to Depot Point. The supporting sledge accompanied them a little over an hour on this day's journey, and turning backward reached Sun Bay in seven hours. The load on the advance sledge at that time was about nine hundred and fifty pounds.

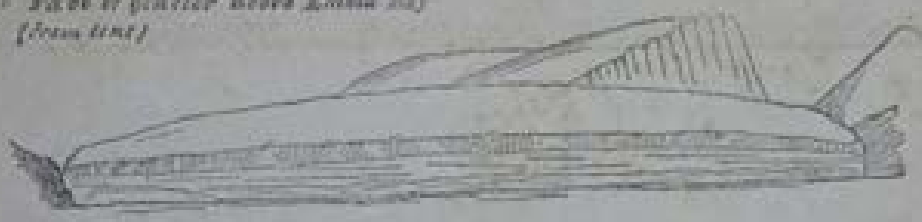
The next march, a short one, carried them to the head of Ella Bay, where they camped in order to examine the country in advance. This fourth camp was situated about sixty-seven miles from Fort Conger. The extraordinary difference between this journey by dog-sledge and the slower method by man-power is illustrated by Lieutenant Archer's experiences in 1876, when a fourteen days' march with an eight-man sledge was required to make this distance.

Near this camp tracks of foxes, hares, lemmings, ermine, ptarmigan, and musk-oxen were noticed. The musk-oxen had passed only a few days before along the shore of Archer Fiord northward to Record Point. A palæocrystic floe was observed near the head of the fiord.

Of Ella Bay, Lieutenant Lockwood says: "The valley be-

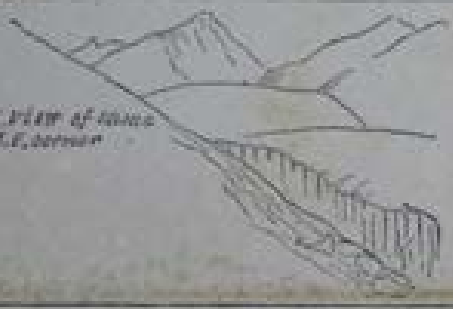
[Facsimile of Sketches made by Lieut. James H. Lockwood on his Trip across Grinnell Land, April to May, 1883.]

Fig. 1. Face of glacier above Emma Bay (from tent)



April 30

2.



Plank view of same from L.F. corner

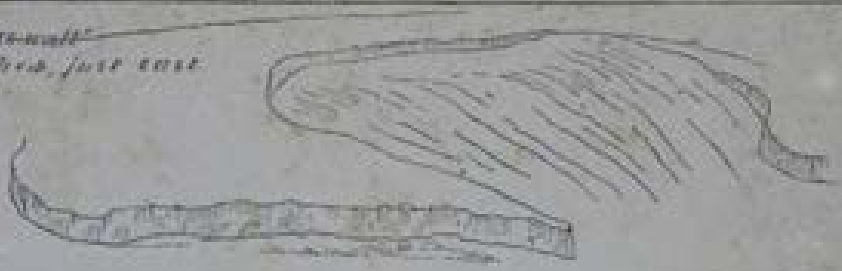
May 1

3.

Mer de glace "Chinese wall" just west of "divide" - looking east (at Lake Harry)

May 14

4. Mer de glace, "Chinese wall" where first approaches, just east of Camp XI



May 10

5.

May 10

Glacier "Ice-berg", head of Greely Fd (Antoinette Bay)

6.

May 12

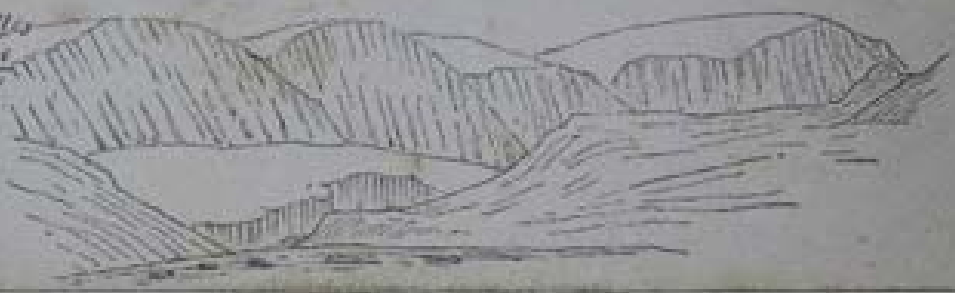
Off-shoot of the Mer de glace. The same as Fig. 2. The hill sides on the left of each correspond. Near head of lake between Camps XII & XIII

7. Glacier 'flee-berge' at glacier at head of Gravely Fiord

May 13

8

Glacier entering Valley
The cliffs to the right are at the head of the fiord (Intrinsic Bay)



May 12

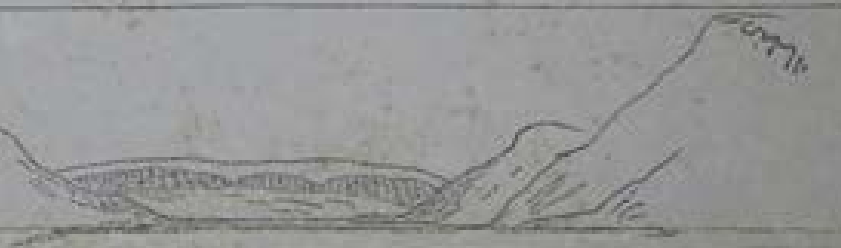
9

Lake, glacier and mountains from west end of lake, C. XII
The route lies through the fore-ground of the sketch in the direction of the arrow head

May 12

10

Glacier and cliffs from east end of lake; Camp XII is in the right fore-ground

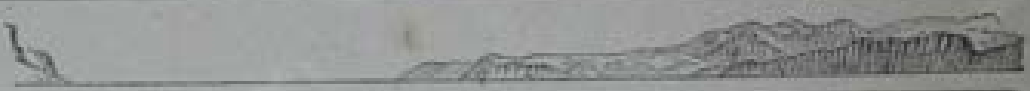


May 12

11 View to the west from head of fiord
The cape to the left proves west extreme of cay at head of Gravely Fd.

May 13

12 View to the west from Farthest



May 14

13 Farthest land on south side (from unknown shore some miles)
The arrow marks a seeming branch fiord or channel; a probable branch fiord.

May 15

14 Head of fiord from Farthest Camp XIII lies under the arrow

May 16

yond has a general trend to the southwest, and is walled in by grand heights and cliffs on each side. Its lower part is occupied by a small lake."

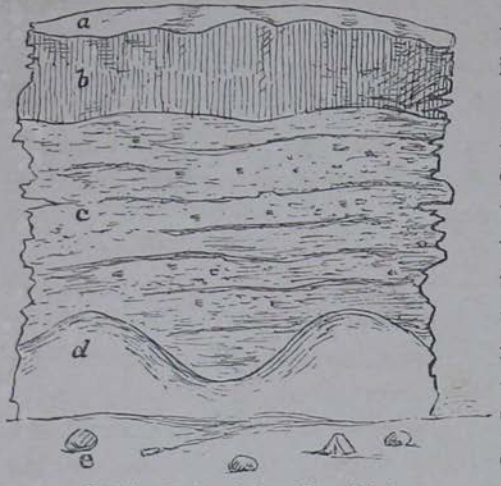
By a preliminary trip, finding the route practicable up Ella Valley, Lieutenant Lockwood left on the evening of April 29th, and a short march of ten miles carried them to the base of the glacier, which was one hundred and fifty feet above the sea. Lieutenant Lockwood says: "Here the terminal face of the large glacier stretched from side to side of the valley, and a very short survey of the scene made it evident that nothing could be done in this direction with either of the sledges." The glacier, which seemed about ten feet high when first observed, proved to be from one hundred and seventy-five to two hundred feet in height (see Nos. 1 and 2).*

Travel to the glacier from the bay was very difficult, owing to deep snow and projecting stones in the bed of the water-course, which was necessarily followed. During the march a lake, "four miles long, which occupied the breadth of the valley, and was covered with snow," was passed.

During two days spent at this place, Lieutenant Lockwood and Sergeant Brainard climbed the precipitous cliffs to the eastward of the glacier, attaining an altitude of four thousand four hundred and forty-four feet, on a summit which was named Mount Difficult. "To the south," says Lieutenant Lockwood, "lay a mass of cone-shaped mountain peaks, separated by deep and narrow valleys, the whole covered with ice and snow. Several glaciers were seen in this direction. To the west and southwest many isolated summits were also noticed, but they seemed mostly great dome-shaped heights, rather than peaks, rising like waves on the horizon. A peak was noticed at a

* The numbers used in this Chapter, refer to fac-similes of Lieutenant Lockwood's original sketches.

great distance, probably seventy-five miles, bearing south 60° west. Northwest of the valley could be seen several glacier-like formations. The country to the west and south is apparently ice-capped. At this season, however, it is very difficult to distinguish at a distance between ice and snow; the only sure test is the sight of a glacier-wall or break in the surface. These walls almost always have a greenish tint.



Ella Valley Glacier.—Section of Face of Glacier.

a. Edge of top overhanging in places as it appears from below.
b. Pure ice of a beautiful green color.
c. Ice white and chocolate color, full of small stones and streaks of mud or earth.
d. Apparent snow bank but probably moraine covered with snow.
e. Level of valley, scattered boulders and lumps of ice.

"The valley of Ella Bay above camp continued to trend to the southwest for about twenty-five miles, where the pyramid-shaped mountain terminated it. The glacier occupied its whole extent, and may have a continuation to the south. A branch glacier came in from the north just above the camp. . . . The face of the glacier near camp was sixteen hundred yards, and the vertical front was one hundred and fifty feet high from sextant angles. . . . As the valley apparently narrowed little or none in width, I assumed that its gradient remained the same, and that the glacier attained an immense depth."

Contrary to general experience in Grinnell Land, this glacier

had considerable chocolate-colored ice, full of small stones and streaks of mud or earth. The face of the glacier must have been nearly two hundred feet high, as it measured one hundred and sixty feet above the top of two high snow-banks, which were probably snow-covered moraines. The edge of the glacier overhung slightly in places. Below this was a section of clear ice, which was of a beautiful green color. This was in parallel layers and gave place lower to the main ice, which was dead white, broken by the streaks, etc., referred to.

On May 2d Sergeant Brainard visited the north flank of the glacier, and found travel possible for a short distance along its precipitous sides, but could discover no way of flanking it or ascending to its surface.

Lieutenant Lockwood decided to try the route via Beatrix Bay, and if necessary by Simmonds Bay. Having determined the position of the glacier, which was situated in 81° N., 70° 41′ W., he started for Beatrix Bay, making two leisure marches as he had abundant provisions. Lieutenant Lockwood says:

"The cliffs around these bays (Ella and Beatrix) are particularly grand, rising almost vertically three thousand feet and more. I measured those on the south side of Ella Bay, and found them four thousand and ninety-seven feet high. They are probably all ice-capped. Miniature glaciers were observed hanging from the edges in places."

A day was spent in reconnoitring the route to be followed. The main valley, trending north-northwest, was taken, which is, says the report, "three miles wide, and is walled in by the most impressive cliffs, very steep and of immense height. A march of nine miles brought us to its head (seven hundred feet elevation), and it hardly appeared practicable to proceed farther with a large sledge, and we again lay over a day to reconnoitre."

They ascended the highest cliffs, crossing a lake which occu-

pied an elevated depression on a divide between two water-courses, and apparently drained both southward to Archer Fiord and northward toward Chandler Fiord. He says: "The Garfield and United States Mountains were quite prominent, and in the midst of the former the Henrietta Nesmith glacier was seen. The depression occupied by Lake Hazen was readily detected. The most conspicuous object was a line of cliffs about six miles to the north, seeming to mark a large valley (Musk-ox Valley) or lake extending from east to west. Toward the southern quadrant the country seemed greatly elevated, and had every appearance of being ice-capped. To the south about ten miles was an ice-wall, doubtless the flank of the branch glacier noticed south of Ella Bay. Many dome-shaped heights (hog-backs) were seen in this direction, most of them over five thousand feet in altitude."

Lieutenant Lockwood concluded that the cañon to the south-west would afford a route outside, but first reconnoitred the valley (Musk-ox Valley) to the north.

The dog-team and small sledge were taken, by which they reached a crest overlooking Musk-ox Valley, the descent into which was so steep that it required an hour's travel through a gorge (called Rocky Gorge by Lieutenant Lockwood) to reach a river in the valley. The valley trended from west-southwest to northeast, and appeared level, but two hours' travel to the northeast showed that it drained in that direction. The river evidently flows into Chandler Fiord at Ida Bay.

The field journal says: "The valley (Musk-ox) is three or four miles wide, bounded on the north side by cliffs, and on the south by similar, but not so precipitous, heights. Its extent, as seen during the day, was about fifteen miles in a straight line. Before returning to camp we saw four musk-oxen, and shot one for dog-food."

This proved to be a cow, which was nearly ready to deliver a calf. This was the first musk-ox killed during the year, and, in fact, the only one, except those obtained at Black Rock Vale.

The direction in which this valley trended decided Lieutenant Lockwood to follow it; but, to succeed, he found it necessary to reduce all weights to the lowest limits. The sledge-runners had all been badly worn by the preliminary journey, and Lieutenant Lockwood concluded that he could scarcely travel longer than twelve days with the sledge. He returned to the large tent and sledge, which he considered his base, situated in 81° 17′ N., 70° 46′ W., and seven hundred feet above the sea. The party left again on the morning of May 8th, with eleven days' rations for men and dogs, which, with the sledge and remaining outfit, weighed only three hundred and twenty-eight pounds. They reached Musk-ox Valley through Rocky Gorge, and, travelling about six miles up the valley to the west-south-west, camped in latitude 81° 18.5′ N., 71° .01′ W.

The following day's march carried them to the apparent end of the valley, where a couple of hours were lost in determining their route. They finally followed a cañon to the south, which seemed to end in a glacier visible eight or ten miles in advance. This cañon was exceedingly rough, its bottom consisting entirely of huge rocks and stones which were scarcely snow-clad, but no other route seemed possible. Lieutenant Lockwood says: "The sledge had overturned shortly after starting on this day's march, the uprights of one runner being all broken short off in the mortices, but we mended it after a fashion. Now the runner flopped over so continuously that it was necessary to camp and fix it after eight miles' travel."

This camp was in 81° 15.5′ N., 71° 46′ W. There, owing to the broken sledge, not only a day's rations for return, but snow-

shoes and everything else which could be spared, were left behind so as to ensure the greatest success.

The gap took them into a broad, plain-like valley, with a considerable lake in its centre. "The wall of a glacier apparently rose all along the south side of the valley just back of the low range of hills on that side, and the country behind it seemed one continuous glacial surface (see No. 4).

A short day's march to the southwest disclosed to them an extraordinary physical condition of the country. They discovered that the ice-capped land to the south of them presented to their view a vertical face of solid ice, ranging from one hundred and twenty-five to two hundred feet in height. The perpendicular face of the ice-cap, and its close conformity to the face of the country, caused Lieutenant Lockwood to temporarily name it "The Chinese Wall" glacier, which was later, in honor of the great Agassiz, designated, with Lieutenant Lockwood's hearty concurrence, Mer de Glace Agassiz. As that officer expressed it to me, on mountain tops or in the beds of valleys this ice ran across the country with an almost unvarying height in the same manner as the Chinese wall.

Camp was made at an elevation of about twelve hundred feet above the sea, in 81° 08″ N., 73° 41′ W.

"At this point," says Lieutenant Lockwood, "the glacial wall, by sextant angles and distance paced off, was one hundred and forty-three feet high. We now followed along the wall, gaining a greater altitude in every hour's travel, keeping the same general direction until we gained the top of what is doubtless the water-shed of Grinnell Land. A detour of a mile or two to the north gave a slightly greater elevation, the barometer showing twenty-six hundred feet above the sea-level. The view to the south was cut off by the mer de glace, which by its gently undulating surface was visible a few miles beyond the edge form-

ing the horizon in that direction. . . . To the right (east-northeast) were seen several lofty domes, evidently ice-capped. . . . Toward the northwest several miles a large lake was discovered, probably ten miles across. A streamlet extended to the southeast from it to the 'Chinese wall,' and occupied a depression forming a wide sloping valley. . . . A mountain peak appeared to the north, which, from its bearing and distance, must have been Mount Arthur. The ground adjoining the great wall on either side of the divide had a gradual slope to the north. I was surprised to see no continuous ravine, or noticeable water-course, which served to drain the melted ice to the east and west.

"Many lakes were seen and crossed along the wall (glacier front), and in places narrow ditch-like gulches, washed out evidently by the water; but the glacier face extended up hill and down hill, across the country, in a very arbitrary fashion." Just to the westward of the divide, beside a "steep snow-bank with an almost vertical face of sixty feet," they made Camp No. 4, in 81° 05′ N., 74° 41′ W.

The next march was down a narrow gorge bounded on either side by towering mountains of so steep a gradient that in forty-five minutes they reached a deep, narrow valley of a thousand feet less altitude. This route was the only one by which the descent could be made.

Several miles down the valley they passed a branch valley to the left, filled by a large glacier which discharged into a considerable lake and a second glacier also entered the same lake from the southwestern end. On this lake they made Camp No. 5, in 80° 56.5′ N., 76° 13′ W.

The sixth march, rapidly descending, brought them to the salt water and the head of a fiord, which was called by Lieutenant Lockwood, in my honor, Greely Fiord.

At the head of this fiord the last glacier discharged. "A few miles farther west a large twin glacier came in from the south. About eight miles from the lake we passed through some low, oval-shaped mounds of ice a foot or two high, scarcely resembling anything seen before. Two miles farther on we crossed the tracks of a bear going up the fiord, evidently followed by a fox. After proceeding a half dozen miles we came to a glacier meeting the valley at an acute angle. It filled quite a wide cañon or valley coming from the east (see Nos. 8, 9, and 10). We passed it on a terrace between its flank and the cliffs to the right. We proceeded about twenty-six miles down the fiord and camped at the farthest, May 13th, in a heavy snow-storm, at 12.30 P.M."

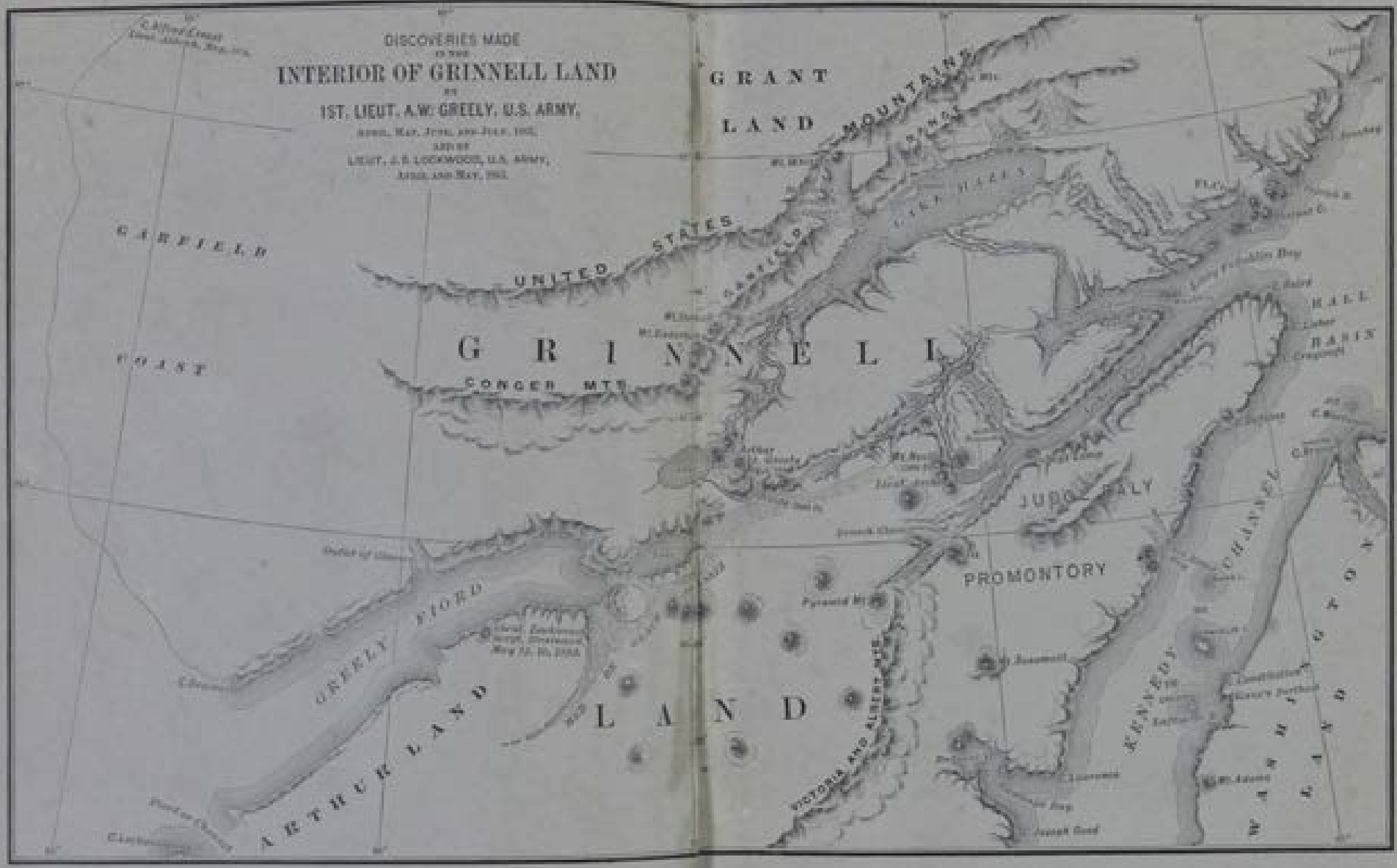
By fasting nineteen hours, and reducing the rations for dogs and men on the homeward journey to the lowest limit, they were enabled to remain at the farthest until the storm abated.

The latitude of that camp was 80° 48.5′ N.; longitude, 78° 26′ W.; magnetic variation from fourteen observations, 116° 35′ W., with a possible error of 1° 3′.

Lieutenant Lockwood's journal says: "After travelling nearly an hour we came to a line of what seemed 'floebergs;' there was no *perceptible* difference in any respect; they were detachments from the glacier. After. . . . drawing the outlines of some of the bergs (see Nos. 5, and 7) we proceeded."

Lieutenant Lockwood and Sergeant Brainard ascended a high cliff four miles to the west of the camp. Of the outlook, Lieutenant Lockwood speaks as follows:

"Greely fiord is between sixty and eighty miles long, the south shore being considerably longer than the north. Whether the farthest cape (Lockwood) on the south side was on the same or another land could not be determined. The fiord near its head


DISCOVERIES MADE
INTERIOR OF GRINNELL LAND
1ST. LIEUT. A.W. GREELY, U.S. ARMY,
GRANT
LAND
MOUNTAINS
UNITED STATES
GARFIELD
COAST
GRINNELL
CONGER MTS
HALL
BASIN
JUDGE PALY
PROMONTORY
GREELY FIORD
ARTHUR LAND
LAND
VICTORIA AND ALBERT MTS
KENNEDY CHANNEL
WASHINGTON
LAND

may be ten miles wide, and at its mouth fifteen or more. The whole shore is bounded by steep, high cliffs, broken by ravines, valleys, and a few branch fiords. At the head it forms two bays, the one to the north probably similar to the southern one traversed by us, which was the outlet of a long valley or lake. Thirty or forty miles from the north shore, extending east and west, was a conspicuous mountain range. Toward the northwest, nearer, was a large glacier. From the cliffs ascended (elevation twenty-two hundred and fifty feet) the country to the south appeared more uniform, being a series of immense ice-capped undulations of great elevation. A glacier was distinguished twenty miles to the south, apparently another offshoot of the 'Chinese wall,' as the face of a great mer de glace was traced a few miles toward the east and west.

"En route Sergeant Brainard discovered fossil remains on the mountain top, and soon we had quite a collection. There was a shell, and what we took to be petrified wood, fish, etc. A few specimens of grasses, etc., were also collected, and a ptarmigan was seen."

That evening Lieutenant Lockwood travelled several miles out into the fiord, and examined the country to the westward with a telescope (see Nos. 11, 12, 13, and 14). "After going out some distance," he says, "another point began to make its appearance beyond the farthest one heretofore seen on the south side, the first point being ten or fifteen miles, and the second from twenty-five to thirty miles distant. Between the two seemed a fiord, the same disclosed from Fossil Mountain, doubtless, and a few degrees in azimuth farther to the right. Sergeant Brainard and I examined the mouth of the fiord carefully with a telescope, which after some time brought out very faintly a cape (Lockwood) still farther to the west, projecting a degree or two beyond the last, and estimated at sixty miles distant.

Between Cape Lockwood and land's end (Cape Brainard) repeated scrutiny revealed nothing but the horizon."

On May 16th the party started homeward. Near the head of Greely fiord two seals (*Phoca hispida*) were seen, but they were unable to obtain them.

The field journal says: "The little sledge sank frequently until the snow was above the slats. Journey extremely fatiguing. The dogs begin to show the effects of short rations; there is now nothing to give them. Of our own rations, three meals of sausage were made to last six, which, with seven ounces of hard bread, was entirely insufficient."

Eleven hours' steady travel brought them to their old camp on the lake. The day following, in crossing the snow-bank, Lieutenant Lockwood says: "The dogs climbed to the top, and by means of a long seal-thong pulled the sledge up from below with everything on it." At this camp, the dogs being very weak, he was obliged to kill one of them, the feeblest, for dog-food. It was completely devoured by the rest of the team during the night.

On May 18th, before starting, Lieutenant Lockwood ascended, with Sergeant Brainard, a height two miles to the south to observe the country. He says: "The great (glacier) wall referred to above could be clearly seen to trend off to the southwest (see No. 3), and when lost sight of was distant about forty miles. To the east of it, but much nearer (about fifteen miles), were the ice-capped domes or hog-backs referred to.

"The glacier at the head of the lake was clearly seen to issue from the great mer de glace; the point of confluence was only about six miles distant.

"The whole surface of the country to the south of the wall (glacier front) seemed nothing but ice." During the march this day Lieutenant Lockwood followed the glacial wall, and dis-

covered a small lake near it. A snowbird and hare-tracks were seen.

Lieutenant Lockwood says: "I had intended ascending the glacier near the divide, at the only place where such a thing was possible; but, on account of the state of our eyes and the strong wind, I gave it up."

Three marches brought them to their base of supplies at the head of Beatrix Bay, both men and dogs in a ravenous state of hunger. Of his supper on starting for the last march, Lieutenant Lockwood says: "No bread, sugar, or coffee. Rabbit stew, the pieces of meat being stolen by Howler." Fresh tracks of three musk-oxen, and a passing owl, were observed on the 20th, as well as traces of foxes, hares, lemmings, and ptarmigan.

On his return Lieutenant Lockwood examined the valley at the head of Simmons Bay, which was found to be filled by an extensive lake some fifteen miles long. He was surprised to find that the head of the lake was separated from Musk-ox Valley by a low divide about two hundred feet high, so that the river of that valley must necessarily drain into Ida Bay. The lake in Simmons Valley, walled in by immensely high cliffs, drains into Archer Fiord through a chain of small lakes. The entrance to the valley was formed of two huge walls, which separated just enough to permit the passage of the stream.

On May 23d Christiansen killed a harbor seal (*Phoca hispida*), weighing about two hundred pounds, in Archer Fiord.

On May 26th they reached Fort Conger, having been obliged to abandon one of the dogs, Disco King, within sight of the station. The case of this animal illustrates the spirit of faithfulness to be found in a good Eskimo dog. He worked until his strength was entirely gone, and when released from the harness died of exhaustion, without being able to crawl to the station, which was in sight.

This party travelled four hundred and thirty-seven miles during their month's absence, and encountered great hardships and privations, on which I have not dilated. Both the journey and the discoveries are extraordinary, and speak for themselves.

I add, from Lieutenant Lockwood's sledge journal, a description of one of the most remarkable discoveries in the Arctic regions—the Mer de Glace Agassiz, which extends for eighty-five miles across Grinnell Land, and, with its vertical front of an average height of a hundred and fifty feet, forms, with the glacial ice-cap of the United States Mountains, wonderful boundaries of the no less extraordinarily fertile belt of Grinnell Land, with which they strangely contrast.

"The great mer de glace discovered on this trip," says Lieutenant Lockwood, "extends, I think without doubt, continuously from Archer to Greely Fiord. From a mountain near the second camp on our return, the wall was seen trending off to the southwest to an estimated distance of forty miles. It was also seen in other places than have been mentioned in my field journal, and the general aspect of the country to the south seemed to confirm this idea.

"It is hard to form an opinion of the extent of the mer de glace to the southward of its northern face. The *ice* was often clearly discerned for six miles or more, and the prospect to the south was always *white*, and apparently that of an ice-clad surface,—very high.

"On account of this elevation I could rarely see very far *directly south*, even from mountains. Judging from this fact, the mer de glace must be of enormous depth just back from its face, unless its base rises in altitude toward the south, which the slope of the ground to the north renders unlikely.

"The height of the wall (vertical face) bears an insignificant proportion to the elevation back of it; that at the head of the

valley of Ella Bay was one hundred and sixty feet above the terminal moraines, and at the camp near the divide of Grinnell Land one hundred and forty-three feet. I think the latter exceptionally low. Both heights were determined by sextant and distance paced off. The wall was much higher in some places. This wall is lined all along its foot by blocks and fragments of ice constantly breaking from the face above. The noise of falling ice was often noticed.

"No moraines or foreign matter of any kind were observed on the surface, and crevices were extremely few and insignificant, except on the offshoot above Ella Bay and the two above Greely Fiord. The surface was often noticed to have a mottled appearance, probably due to slight depression in its gentle undulations. Of moraines along the wall there were very few, but in one place a low ridge of earth and stones ran parallel with it a few feet out.

"This 'wall' was generally of a uniform white color; the glacier face above Ella Bay was distinctly marked green above and white below. In one or two places, for a few feet in extent, the mer de glace sloped down to the ground, and here, apparently, might have been ascended. Elsewhere the wall formed a continuous vertical plane.

"The ground to the north of it, especially on the divide, had a singularly smooth appearance, as if it had once formed the base of this mass of ice."

The endurance, loyalty, and pluck shown by Lieutenant Lockwood and Sergeant Brainard were commendable to the highest degree. To complete to the utmost their explorations and discoveries, the entire party lived on half rations for a week, besides suffering other great discomforts attendant on such a journey. Sergeant Brainard's sterling qualities were shown in this as in all other works.

Lieutenant Lockwood's loyalty in this matter impressed me with particular force, and is worth much as an example for future subordinates. He originally deemed the crossing of Grinnell Land an impossibility, and, before starting, had entreated me to permit him instead to examine the glacial system north of Lake Hazen. His persistence, energy and fidelity in pursuing the route via Beatrix Bay, after failing in Ella Bay, evidenced most strongly his determination that his commanding officer's idea of the practicability of crossing Grinnell Land should not fail through him, and resulted in a successful overland journey hardly second to his work the year preceding.

SEA FACE OF ICE FOOT AT DISTANT CAPE.

(From a photograph.)

CHAPTER XXXIII.

POLAR ICE.

IN describing the various sledge journeys I have avoided very frequent allusions to the character of ice encountered, believing the subject could be more satisfactorily treated by itself. The technical terms used in connection with ice are given in a glossary.

The ice-foot is composed of ice adherent to the land, which grows largely by accretions during the spring tides, but upon which much ice is pushed by the crowding of the main pack against the shore. The general appearance of such pressed-up ice is shown by an illustration from a photograph of the sea-face of the ice-foot near Distant Cape, which, taken in June, shows it only after much worn and wasted. The formation here shown was originally on an extraordinary scale and of great beauty.

The word floe is a very indefinite one, being applied to any single piece of salt-water ice whether large or small. It is applied irrespectively to such pieces, whether of original formation or enlarged by accretion of other floes, which, cemented, form a whole. Its most general use is in its application to the whole united covering of a bay, strait, or sea, which is called the floe, or the harbor-floe, etc.

The floe commences forming to the westward of Cape Sabine about September 1st, and from that date until the following July it may be considered that the harbor and bay floe will remain whole and unbroken.

An appendix to this volume gives the greatest thickness of the new floe observed by various Arctic expeditions. From the table it will be seen that within the Arctic regions the average thickness of the floe is only seventy-six inches, and its limit of increase is reached about May 1st. It will farther be noticed that the latitude of a place has very little to do with the thickness of the sea-floe, or, indeed, with the difficulty of navigation.

It is certain that any confined polar sea, with feeble tides, and weak, uncertain currents, must be unnavigable even in very low latitudes. Such conditions obtain in the Polar Ocean northward of Behring Strait, where successful navigation cannot be hoped for, and likewise explain the uncertain navigation of Kara Sea. The causes are simple. The short summer months cannot melt the ice formed during the long winter, as is evidenced by the large quantity of ice which remains at the end of summer, even in large lakes or bays to the south of the Arctic Circle. As the ice cannot melt, it remains a constant obstruction to navigation, unless strong currents carry it into distant seas.

This ice, at the end of summer, is quickly cemented into a limited mass in bays and harbors, but in larger water-spaces the floe is ceaselessly separating and reforming under stress of tides, currents, and the action of the cold. The old floe, wasted by the summer sun, increases in thickness the second winter very slowly, and is scarcely thicker the second year than the first.

It is evident that a limit to its thickness by direct freezing is soon reached, and I doubt it being more than twelve or fourteen feet at the utmost. Near the head of Chandler Fiord, where the conditions for accretions year by year were most favorable, I saw no floe-ice more than ten or twelve feet in thickness.

I hazard little in stating that there is more polar ice under than over six feet in thickness. Walker, in the drift of the Fox, 1858–59, down Baffin Bay, estimated the floe to average five feet in thickness.

It thus appears that the many fields of ice which are to be found in the Arctic seas ranging from ten to fifty feet in thickness cannot be the result of direct freezing. In all parts of the Arctic Circle are found large floes, which have been formed by "underrunning."

The power generated by the rapid motion of immense fields of ice produces, under certain conditions, effects and consequences which are almost inconceivable. A field in motion coming against another field results in the instant upheaval and destruction of the edges of the conflicting floes. The deepest floes underrun the lighter ice, and huge masses, hundreds of tons in weight, are frequently forced upon the other floe. I have seen piles of such broken ice, from twenty to thirty feet in height, extending a hundred yards inward along the edge of a heavy floe for a half mile. The resulting broken, irregular piles of ice are known as rubble, which is the worst of all ice for travel. An engraving from a photograph of rubble ice is to be seen on page 225 of vol. i.

The almost irresistible power developed by the motion of heavy fields was illustrated in our own experiences, when a single palæocrystic floe, about a mile square and forty feet or more in thickness, was broken into several pieces, some of which were ground up into fine rubble ice. The action of the summer sun upon such masses of rubble ice frequently reduces them to a single homogeneous floe. Nares describes exactly the condition of the polar pack in most seas, when he says: "A polar floe only one year old is composed of a quantity of conglomerate ice pressed together by the general movement of the

pack, and then frozen into a floe ten feet and upward in thickness."

Another ice formation, the iceberg, is better known to dwellers in middle latitudes. The marked characteristics of icebergs are their bluish-white color, the granulated appearance of the ice, their opaqueness, and stratification.

Polar navigators need not be told that most of the fantastic shapes to be found in illustrations of icebergs exist only in the imaginations of the engravers. The icebergs of Disco Bay are reproduced strictly from photographs, and illustrate the most remarkable forms noticed. In general, icebergs are tabular or pyramidal in shape; they are usually from forty to a hundred feet in height, but occasionally attain as great a height as two hundred feet, and even more. The highest I have known of was reported by Hayes, in 1881, being over three hundred feet. The fiords of Greenland south of the 80th parallel, with their enormous glaciers, furnish the bulk of these bergs.

The most important ice to the northward of Smith Sound is of a different character from that already spoken of, and has received from Sir George Nares the title of palæocrystic, by which name it is distinctively referred to in this work.

It is divided again into floes and floebergs. The palæocrystic floes seen by us ranged from twenty to fifty feet in thickness, with a superficial area to their tops varying from thirty square yards to as many square miles. On leaving Cape Baird, in August, 1883, my diary records a palæocrystic floe which was fifteen miles long and of unknown width. Another floe, between Cape Beechy and Cape Sumner, was of such extent that a sledge party was nearly two days passing over it. The surface of such a floe resembles closely a piece of rolling country. It is by no means level, but has its hills and dales, its water-courses and lakes; in fact, it is an island where ice replaces earth.

The floeberg is a huge, elongated, cubical block of ice of a vertical height of from fifty to eight hundred feet, and having sides varying from twenty to a thousand feet in length. The largest one seen by me was about eight hundred feet high, (nearly ninety feet above the sea,) six hundred feet broad, and nine hundred feet wide, nearly a perfect cube. The floebergs of Kennedy Channel resemble sections of the smaller of the flat-topped icebergs of the Antarctic Ocean, some of which were estimated by members of the Challenger Expedition as being possibly three hundred feet high (three thousand feet thick) and three or four miles long. From the excellent drawings and descriptions of Antarctic icebergs, given by Moseley, in "Notes of a Naturalist," I entertain no doubt as to the identity of northern palæocrystic floes and floebergs with the southern ice.

In short, a floeberg differs from the ordinary iceberg in the regularity of form, as shown in the former by flat top, vertical sides, etc., but it has its birth, equally with ordinary icebergs, in the ice-cap of glacial lands. The irregularity of Atlantic icebergs can well be referred, I think, to the large number of crevasses caused by the sharp gradient by which the glaciers rapidly descend into the sea.

I went into the Arctic seas with no theories as to ice, knowing that a difference of opinion existed on this point between Nares and his surgeon, Moss. The facts I bring back confirm Moss' opinions on certain points, and enable me to speak with a certain degree of authority on others.

Nares' opinion as to the growth of the palæocrystic floes is clearly put. He says: "On the whole, I conclude that the polar ice increases in thickness below, and not superficially, and by the natural freezing of the water at its lower surface during the winter."

I am constrained to differ from him, as did Dr. Moss, R.N., who says: The "névé-like stratification, the embedded atmospheric dust, and the chemical character of our polar floes indicate, in my opinion, that they are the accumulated snowfall of ages rendered brackish by infiltration and efflorescence."

If polar floes from a hundred to a thousand feet in thickness are formed by direct freezing, why are not the polar lakes, which are subjected to greater cold than the sea, frozen to the bottom? Nares says: "Whether it (the main lake ice) is frozen to the bottom or not we have no means of ascertaining; but it is immovable by the wind." My own observation, covering a dozen large lakes, is conclusive, that the main ice is movable by the wind, as shown in my account of extensive ridges of small stones formed by its pressure. If Lake Hazen had ice at any point frozen to the bottom, it would have been apparent in early spring by the warped and disturbed surface of the ice at the junction of one-year ice and palæocrystic ice, for the level of the lake falls some eight or ten feet every winter, being drained by Ruggles River. On the contrary, the ice near shore lies on the ground, and slopes gradually downward about fifty yards or so, according to the depth, and then is often level and smooth.

Nares suggests that such ice might form in an unenclosed sea, such as Clement Markham Inlet, where he thinks floes increase superficially. Observation is not wanting to disprove this idea. Archer Fiord would afford similar conditions, and Chandler Fiord would be especially favorable for such formation. Such floes were not found in either fiord; and in the latter no ice more than ten or twelve feet in thickness was observed, notwithstanding that several overlying strata of fresh-water ice had formed from the overflow of Ruggles River. The enclosed inlets on the North Greenland coast were particularly free from

any ice resembling floebergs, although their ice-covering, being detached from the main polar pack and apparently unbroken for years, afforded most favorable conditions. I doubt not that the extreme thickness of ice which can form in an almost tideless sea was found by Parry on the north side of Melville Island, which (as I remember) was fourteen feet.

Nares questioned the universality of stratification as advanced by Moss.

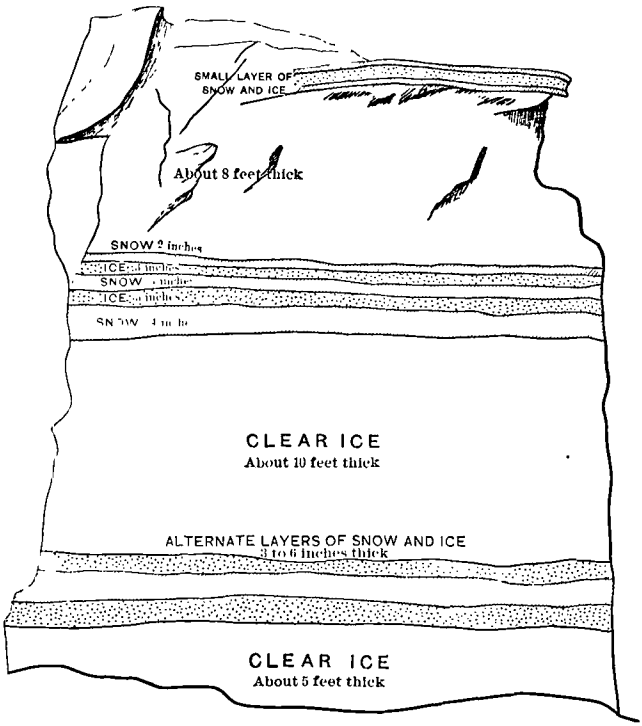
The observations made by our party appear to settle the question of stratification. I very rarely saw a floeberg which was not plainly stratified. Sergeant Gardiner says: "I observed (at Cape Baird) eleven floebergs in which strata were clearly defined. These bergs consisted of wide layers or strata of clear or semi-opaque ice, separated from one another by smaller layers, the latter being also divided into smaller layers or strata of clear ice or snow alternately." The drawing of Sergeant Gardiner, reproduced on next page, shows the general character.

Sergeant Jewell examined a berg grounded off Distant Cape, which, though old and worn, was a magnificent mass of ice. It was nearly hexagonal, with a periphery of almost two hundred feet, and was equally thick, for it rose twenty-eight feet above the main floe. The whole face was cut down for three feet, where clearly defined strata were noted.

Jewell later examined floebergs at Cape Beechy and near Repulse Harbor, and almost invariably found stratification evident, though on occasion the face showed no signs, where long exposure, under certain conditions, had caused the surface ice to melt and reform, thus freezing the sides.

"Near Repulse Harbor," he says, "I observed several fine specimens of palæocrystic floebergs. On some of them the strata were very well defined, from eighteen to twenty-four inches in

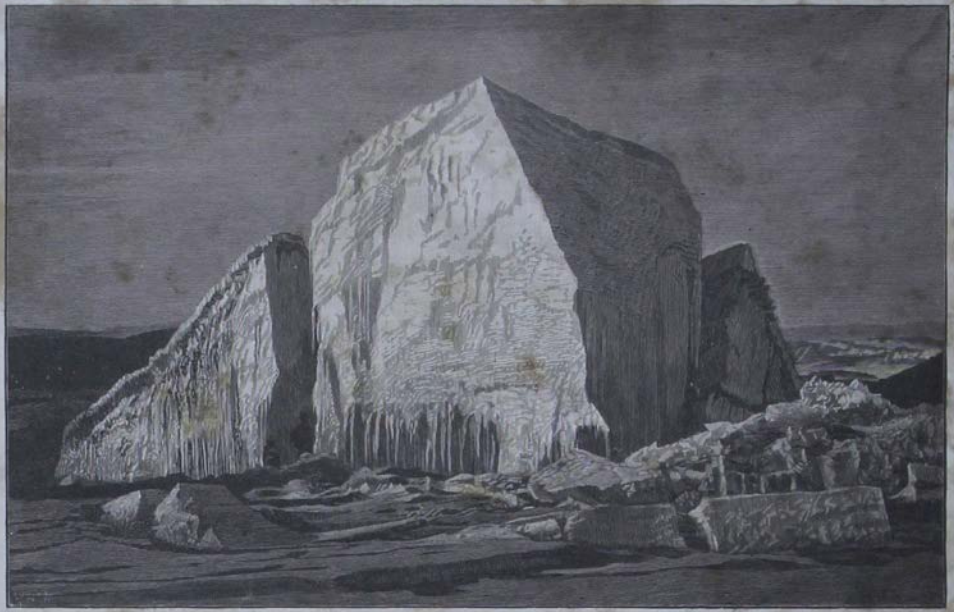
thickness, and varying from five to twelve in number, according to the size of the berg. The difference in appearance of the strata was very marked, some being pure crystal, others of



FLOE-BERG AT CAPE BAIRD SHOWING STRATIFICATION.
Height of Floe-berg about 25 feet above Main Pack.
[From drawing by Sergeant Gardiner.]

whitish or milk color, indicating the presence of snow in its formation."

Colored ice, other than yellowish patches of salt-water diatomaceæ and in frequent dark lines (probably the "dust bands" of Moss), was rarely seen, unless the floeberg remained grounded



A PALEOCRYSTIC BLOCK, BREAKWATER POINT, LADY FRANKLIN BAY.

(*From a photograph.*)

near cliffs. On one occasion, however, a very marked spot of yellow was found, which probably was a deposit, by some animal, in its original formation.

Samples of yellow ice were obtained from the interior of this floeberg, which grounded at Breakwater Point and then split. The berg was eighty feet long, forty feet wide, and thirty-five feet above the floe, and is shown by illustration as it appeared later. The yellow samples were obtained from a spot four feet below the surface of the floe about twenty feet inside the new crack. In a floe of nearly the same dimensions a similar spot was observed ten feet below the surface and twenty feet inside. The two spots appeared to the eye to be of the same character. Both these floes were stratified, although the separate layers differed in color and appearance but slightly. The discolored ice obtained varied from light straw color to a dark brownish yellow. It seemed to be discolored by urine, of which there was a considerable quantity. The melted ice gave out a very marked and disagreeable odor, and left a yellowish deposit as sediment which resembled albumen. Unfortunately its constituents could not be determined at Conger, and the samples were abandoned.

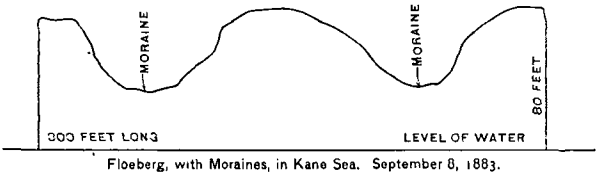
The salinity of floebergs by infiltration and efflorescence is not as difficult a process as might be thought. The readiness with which water forming on the surface of ice passes through it is particularly noticeable. A foot of snow will melt and disappear through five or six feet of ice in a few days, leaving the floe substantially dry. Since this readiness of infiltration is found in salt-water ice, its practicability in floeberg seems assured. The young floe-ice, as every Arctic traveller knows, is speedily covered with minute feathery crystals, known under the name of efflorescence, which contain an extraordinary amount of salt. This is spread abroad by the first high wind, and it requires but

a small amount of it to make the snow with which it mixes absolutely undrinkable. Wrangel it is, I believe, who states that the efflorescence for many miles inland affects the snow on the Siberian Arctic coast. In Grinnell Land I found snow but lately fallen so salt as to be useless for testing thermometers. Under such conditions, and with nine-tenths of its surface immersed in sea-water, it is not surprising that floebergs have considerable saline matter. The facility with which ice *above* the surface of a floe parts with its salinity was noted years ago by Dr. Rae, and verified by our own experience, when Sergeant Brainard, who superintended the selection of ice for water, noticed that ice which was salt one year, when forced up, was fresh enough for potable water the year following. He noticed farther that when the level of the floe was struck, even in palæocrystic ice, it was at once too saline for use.

Comment has been made as to the freedom of floebergs from earthy matter or stones, which, it is argued, must be found on them if they are from glaciers. In this connection it should be remembered that, of all the many miles of glaciers front seen in Grinnell Land, in but two instances were earthy substances noted—one in Henrietta Nesmith glacier, where perhaps a thousandth part of its front was faintly tinged as if with earthy matter; in the other case, at the head of Ella Bay, the glacier is advancing down a narrow valley hemmed in by side hills thousands of feet in height, which accounts for their exceptional presence.

It is thus evident that there is scarcely more than one chance in a thousand for a floeberg bearing stones to be found, and still less for traces of a moraine. Fortunately the chance of examining a moraine came to me during our retreat. On September 8, 1883, about four miles east of Cape Camperdown, I visited a floeberg, the surface of which we were able to reach

over piles of heaped up ice. Its surface was very diversified, there being two valleys, as shown in diagram. The extreme height of the floe above the water was put by Lieutenant Lockwood at about a hundred feet, while I estimated it to be eighty feet, with an average elevation of sixty feet. This block of ice, six hundred feet thick and three hundred square, was a floeberg or flat-topped iceberg which had floated from Kennedy Channel with us. In crossing one of the valleys, my foot displacing a thin coat of lately fallen snow, I accidentally discovered a rock. Examining farther I found two rocks and boulders, one in each valley. There were not far from fifty such rocks, and it was evident that they were medial moraines. Our miserable



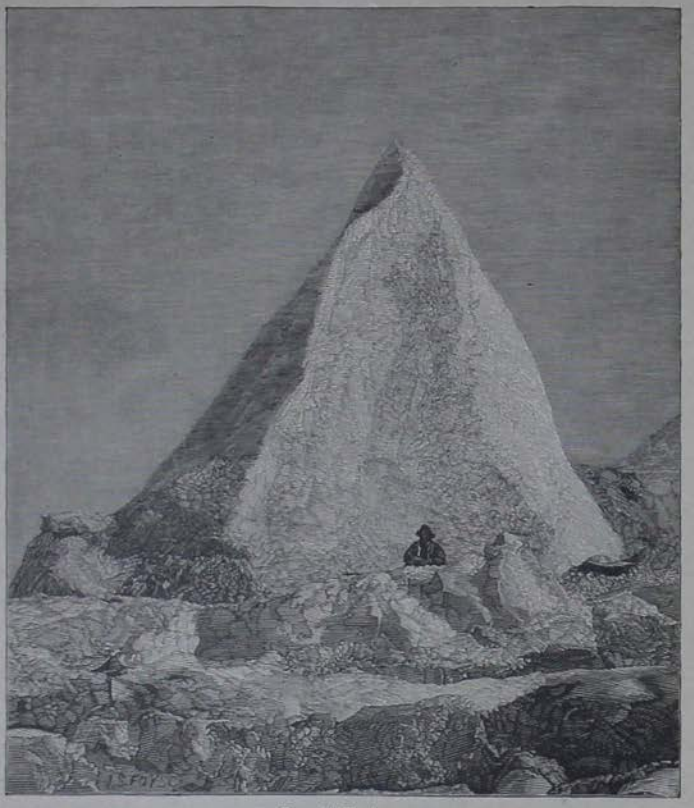
Floeberg, with Moraines, in Kane Sea. September 8, 1883.

condition and dangerous situation prevented anything but a hasty and cursory examination.

I farther learned from Sergeant Rice that the glacier which discharges into Ross Bay furnished palæocrystic floes of no inconsiderable size, as indicated by the sections which were detached by flotation. I saw many small palæocrystic floes detached from Leffert glacier. All the glaciers seen near Sabine had gentle gradient, and could be readily travelled over, having infrequent crevasses except near the snout. But little doubt then remains as to the method and place of birth of these enormous blocks of ice, the grandeur and immensity of which words are too feeble to fittingly portray.

The rapidity with which floebergs melt when grounded has been mentioned in this narrative. In such cases remarkable

and irregular shapes succeed, which are accurately illustrated from photographs in these pages under various titles, as "The Frog" (p. 133, vol. i.), "Pyramid Floeberg," etc.



Pyramid Floeberg.
[*From a Photograph.*]

The Pyramid floeberg, probably broken by great pressure into that shape from a cubical form, was a beautiful piece of ice, a dead opaque white, which, save for a faint bluish tinge, might well have been mistaken for white unpolished marble.

Finally I quote from Lieutenant Lockwood, whose observations show that floebergs, though not of the largest size, are found in Greely Fiord detached from the extraordinary ice-cap known as Mer de Glace Agassiz. He says: "Many small icebergs were seen at the head of Greely Fiord in both the bays, as well as an occasional stray one farther down. They were, so far as I could judge, entirely similar to the ordinary floeberg of the straits (Robeson and Kennedy Channels) and the north coast of Greenland, varying, like the latter, in shade, height, etc. Those in the southern bay, or arm, of the fiord were close to the glacier, and were undoubtedly detachments from it. The others must also have had the same origin. The glacier had great numbers of transverse crevasses near its end, from which it would seem that these bergs break off and fall rather than become detached by their buoyancy. Similar crevasses were noticed at the end of the glacier discharging into the lake just to the east of the fiord."

My own views on this subject conform closely to those so clearly and accurately expressed regarding the southern ice-cap by a great scientist, Mr. W. B. Carpenter, to whose fertile brain and wise initiative the inception and organization of the famous scientific circumnavigation expedition of the Challenger is due. I am gratified that facts gathered by us have confirmed some of the theories advanced by Carpenter.

In an article on the "Deep Sea and its Contents," in the *Nineteenth Century*, he says:

"The transient visit of the Challenger to the Antarctic ice-barrier gave her scientific staff the opportunity of examining the structure of the southern icebergs, which altogether differs from that of the icebergs with which our northern navigators are familiar; these last being now universally regarded as *glaciers*, which have descended the seaward valleys of Greenland

and Labrador, and have floated away when no longer supported by a solid base; and the information they have gathered is of considerable interest, as helping us to form a more definite conception of the condition of our own part of the globe during the glacial epoch. For a number of independent considerations now lead almost irresistibly to the conclusion that the icebergs of the Antarctic are for the most part detached portions of a vast *ice-sheet*, covering a land surface—either continuous, or broken up into an archipelago of islands—which occupies the principal part of the vast circumpolar area. Of this ice-sheet the edge forms the great southern "ice-barrier," which presents itself, wherever it has been approached sufficiently near to be distinctly visible, as a continuous ice-cliff, rising from two hundred to two hundred and fifty feet above the sea-level.

"The icebergs of the Antarctic Sea are, as a rule, distinguished by their tabular form, and by the great uniformity of their height; this, in bergs which show least signs of change since their first detachment from the parent mass, seldom varies much from two hundred feet above the sea-line. The tabular surface of the typical berg is nearly flat, and parallel with the sea-line; its shape usually approaches the rectangular, and it is bounded all round by nearly perpendicular cliffs. From a comparison of the specific gravity of berg-ice with that of sea-water, it appears that the quantity of ice beneath the surface required to float that which is elevated above it must be about nine times as great; in other words, supposing that a berg had the regular shape of a box, its entire depth from its upper surface to its base must be ten times its height above the sea-level. Consequently, if the latter be two hundred feet, the entire height of the mass would be two thousand feet, which might thus be assumed to be the thickness of the ice-sheet from whose margin it was detached. This estimate must not be accepted,

however, as other than approximative. The dimensions of these bergs vary greatly. Those seen from the Challenger were generally from one to three miles long.

"The upper part of the ice-cliff that forms the exposed face of the bergs is of a pale blue, which gradually deepens in color toward the base. When looked at closely it is seen to be traversed by a delicate horizontal ruling of faint blue lines separated by dead-white interspaces. These lines preserve a very marked parallelism, but become gradually closer and closer from above downward, their distance being a foot or even more at the top of the berg, but not more than two or three inches near the surface of the water, where the interspaces lose their dead whiteness and become hyaline or bluish. There can be no doubt that this stratification is due to successive accumulations of snow upon a nearly level surface, the spaces between the principal blue lines probably representing approximately the snow-accumulations of successive seasons. The direct radiant heat of the sun is very considerable even in these latitudes, so that the immediate surface of the snow is melted in the middle of every clear day, and the water percolating into the subjacent layers freezes again at night. The frequent repetition of this process will convert a very considerable thickness of snow into ice; the blue transparent lamellæ being the most compact, while the intervening white veins are rendered semi-opaque by the presence of air-cells. And it is obviously the compression which these undergo that causes the approximation of the blue lines, and the change to a greater compactness and transparence in the intervening layers toward the bottom of the cliff. Slight irregularities in the general parallelism of the stratification, and the occasional thinning-out of particular lamellæ, were easily accounted for by the drifting of the snow-layers of the surface before they had become consolidated. And although there are

various cases in which the strata has been changed from their original horizontality to various degrees of inclination, sometimes also being traversed by 'faults,' and occasionally even twisted and contorted, these might all be accounted for by forces acting subsequently to the detachment of the bergs. For their plane of flotation is liable to alteration by changes of form due to unequal melting and the separation of large masses either above or below the surface; and 'dislocations' of various kinds will be produced by collisions and lateral thrusts when bergs are impelled against each other by the wind. Sir Wyville Thomson and Mr. Moseley entirely agree in the statement that they could nowhere trace any such 'structure' as is produced in a land-glacier during its movement down a valley by the curvature and contraction of its rocky borders and the inequalities of the bottom over which it moves. And the presumption is altogether very strong that these vast masses have originally formed part of a great ice-sheet formed by the cumulative pressure of successive snowfalls over a land area of no great elevation, which flows downward from its highest level in the direction of least resistance; that is to say, from the polar centre toward the continually disintegrating margin, progressively diminishing in thickness as it extends itself peripherally. Thus gradually moving seaward, the ice-sheet will at last pass the margin of the land, but will continue to rest upon the gradually descending sea-bed, flowing down its gentle slope until lifted by its own buoyancy (like a vessel being launched), when vast masses will break off and float away.

"Although the observers of the Challenger did not see either masses of rock, stones, or even gravel upon any of the icebergs they approached, Wilkes and Ross saw many such; and the 'soundings' of the Challenger were found to consist of such comminuted clays and sands as would be the result of the abra-

sion of rocky surfaces over which the ice-sheet had moved, while the dredge brought up a considerable quantity of land *débris*—chiefly basaltic pebbles about the meridian of 80° E., and pebbles and larger fragments of metamorphic rocks farther to the eastward. It was probably from the valleys of the great volcanic range that the rock-masses came which were observed on bergs by Wilkes and Ross; one of which, clearly of volcanic origin, weighed many tons. That the southern circumpolar area is chiefly land, and not water, seems to be farther indicated by the absence of any such low temperature of the deeper water as Sir George Nares ascertained to exist beneath the 'palæocrystic' ice of high northern latitudes; for the thermometers, lowered through borings in that ice, gave 28° Fahr. at all depths, this being the lowest temperature at which sea-water can remain unfrozen under ordinary circumstances. On the other hand, the bottom temperatures taken in the Challenger in closest proximity to the Antarctic ice-barrier nowhere proved to be lower than the temperature of the surface stratum, which was cooled by the melting of the berg-ice, thus indicating the absence of any supply of yet colder water from a source nearer the Pole.

"Thus the Antarctic 'ice-barrier' is to be regarded as the margin of a polar 'ice-cap' whose thickness at its edge is probably about two thousand feet, nine-tenths of it lying beneath the water-line. This margin is not permanent, but is continually wasting away like the terminal portion of a land-glacier—not, however, by liquefaction, but by disruption—and is as continually renewed by the spreading out of the piled-up ice of the area within. What may be the thickness of the 'ice-cap' nearer its polar centre we have at present no means of knowing, but it must doubtless be kept down by the facility of downward flow in almost every direction toward its periphery of ten thousand miles."

The presence of palæocrystic floes and floebergs in the Arctic seas indicates an Arctic ice-cap, which is probably north of the Parry Islands. The great extension of Greenland to the north causes the southward current of the West Greenland straits, and prevents more than an occasional floe from descending into the Norwegian Sea. The shallowness of the Arctic Ocean north of Siberia, where DeLong found in places only seventeen to twenty fathoms of water, explains why he never saw floes thicker than

Pressed-up Floeberg.

eight feet, as the palæocrystic bergs could not enter such a shallow sea. Northeastward of Point Barrow, where the sea deepens, near Banks Land, floebergs were discovered to be numerous by McClure, Collinson, and others. From the number of bergs and their great height it is probable that the sea is quite deep westward of the Parry Archipelago. The largest floebergs cannot pass down Kennedy Channel, which in places is two hundred fathoms deep, but in others much less. Large floebergs were seen aground some distance from the land in Robeson and Kennedy Channels.

CHAPTER XXXIV.

PREPARATIONS FOR RETREAT.

THE subject of preparing for a retreat by boats, in the case of no steamship arriving the coming summer, had naturally engaged my earnest attention during the second winter.

I never for an instant thought of abandoning the active work and important duties with which I had been charged, in order to devote our energies to preparations for a contingent retreat. Such a course would be to fail in duty to the Government I represented.

On the other hand, it would have been manifestly rash and imprudent not to provide against the non-arrival of a relief steamer. Fortunately I saw my way clear, and so prepared properly for the latter contingency without sacrificing the interests of scientific observation or geographical exploration.

I decided to establish the necessary depot of provisions at Cape Baird, which was twelve miles distant, on the south side of Archer Fiord, and in immediate view of the station. That point well supplied we would be able to cross the fiord under any circumstances, and leave there fully rationed and equipped at such time as might seem most favorable to us.

The order for the work was issued on January 31st, and Sergeant Brainard and Christiansen, with dog-team, commenced it the following day. The men were in health, no absence for a night was contemplated, the temperatures —40° to —45°, (—40° C. to —43° C.), were not as low as had been experienced with-

out mishap by our field parties in extended journeys, and we were working toward home.

To my surprise, the surgeon strongly protested against the work as contrary to precedent, and as entailing unnecessary exposure which was quite certain to result disastrously and be followed by accidents for which he should feel responsible, etc.

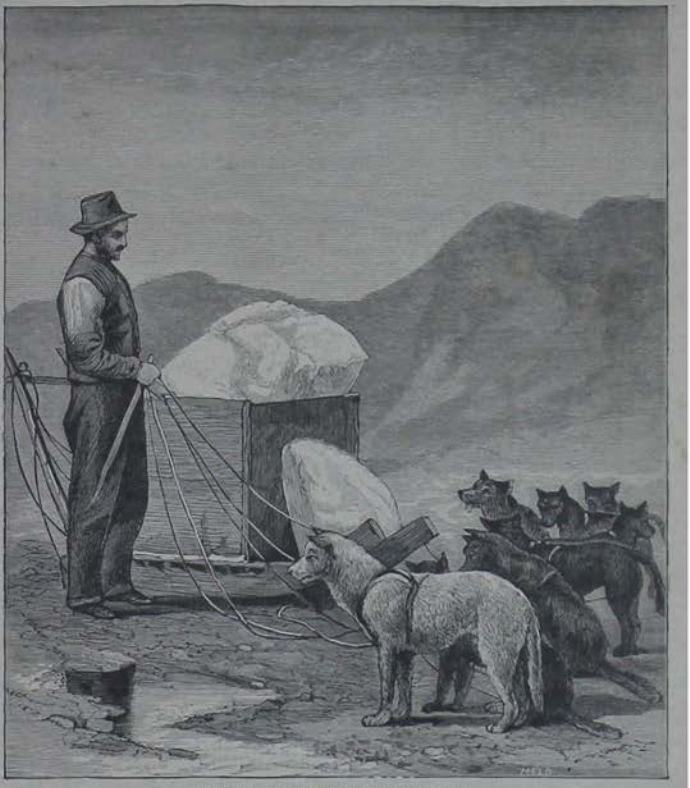
The Lady Franklin Bay Expedition was not happy in its surgeon; Dr. Pavy was an excellent physician, but his previous Bohemian life made any restraint irksome and subordination to military authority particularly obnoxious. A man of active mind and quick parts, his lack of any order or system proved most injurious to the natural history interests, which were in his charge. His unfortunate death causes me to refrain from farther comment than is absolutely essential.

His protest against this work, which was not only calculated to, but did, enormously lighten our autumn labors and insured a safe retreat, was the first of a series by which he opposed all work initiated the last year by his commanding officer. The correspondence between us forms part of my official report, and has no place here.

The work was prosecuted as rapidly and continuously as possible during February and March. No accident or injury resulted, and the stores accumulated at Cape Baird proved of vital importance later in the year.

To farther insure our safe retreat, I decided later to bring from Thank God Harbor the English ice-boat left there by Lieutenant Beaumont in 1876. On April 10th Sergeant Rice left, with ten men, to obtain the boat. He was assigned to the command of the party on account of Lieutenant Lockwood's absence and Dr. Pavy's expressed unwillingness to assume any responsibility with this work, claiming that his duties with the expedition were strictly those of a medical officer.

He was ordered to accompany the party as a medical officer, in accordance with his own wish however, for medical considerations. The puppy-team, driven by Schneider, hauled the greater part of the constant weights.



Schneider Hauling Ice with Puppy-team.

Sergeant Rice returned on the 15th, having made a most successful trip, by which the ice-boat was brought in in perfect condition to Dutch Island, whence it was hauled, a few days

later, to Cape Baird and carefully secured for possible autumn work.

The excellent physical health and powers of endurance indicated by this journey were most gratifying. The twelve men sent out were but an average of the party, yet they made the round trip of ninety miles in six days, subjected to a mean temperature of −21° (−29.4° C.) and no single reading higher than −13° (−25° C.). No frost-bite or mishap of any kind occurred. Lieutenant Kislingbury, who volunteered, and Sergeant Brainard, who had just returned from the Polar Sea, were sent out on the 14th to assist Rice, but met them a few miles east of Distant Cape and were only able to haul in the constant weights the last day.

The foot-gear for this trip, skilfully manufactured by Frederick from untanned seal-skin (ugsuk) and German stockings, answered the purpose admirably, and relieved me from apprehension of trouble in this respect during the prospective retreat. As before mentioned, our stock of foot-gear was insufficient for two years, and the non-arrival of the visiting steamer necessitated care and economy.

On May 1st the naturalist of the expedition was directed to furnish by May 31st as complete a report concerning the natural history of the expedition as was possible. A description of all specimens on hand was to be given, and such notes made as would facilitate the speedy rendering of a report on the return of the expedition, or as would secure similar results if their abandonment should be necessary. This order was deemed essential to prevent the entire loss of our labors in case of a contemplated retreat by boats. He was also ordered to furnish by May 20th six complete sets of botanical specimens, so arranged that they could be securely transported and duplicates be intrusted to each officer of the expedition. The plants

and lichens obtained the first year proving unsatisfactory, an entire new collection was made in the summer of 1883.

On June 1st it became essential, in the interests of the scientific work pertaining to natural history, to change our naturalist. The transfer of specimens, and notes concerning them, to Lieutenant Lockwood revealed the fact that no proper or systematic attention had been paid to this work. Repeated verbal reports to me had led me to believe that the specimens obtained had been properly preserved, and complete notes made concerning them. The gaps in natural history notes were subsequently filled, in a measure, from my private journal, which unfortunately was not as full as could be desired, owing to my want of familiarity with these subjects. During the summer of 1883 very complete sets of botanical specimens were obtained, the greater part of which were collected by me and most beautifully pressed and arranged by Sergeant Elison. Any missing plants were supplied by certain of the enlisted men—Bierderbick, Brainard, Gardiner, Cross, Connell, Henry, and Whisler. Long and others secured many specimens of birds, and Brainard and Gardiner made fine collections of fossils and petrifactions.

Special credit in connection with the natural history work is due to Sergeant Elison, who devoted himself with close application and untiring zeal to the proper preservation of the specimens. Lieutenant Kislingbury also made an extensive and valuable collection of lichens, which was likewise abandoned.

Lieutenant Lockwood classified and arranged the entire collection of natural history specimens, which, labelled and systematically put up for transportation, were securely packed in boxes and barrels. These collections could have been loaded on the expected steamer in a couple of hours, but were necessarily abandoned, except the botanical specimens.

A few days remaining after this work was done, Lieutenant Lockwood and Sergeant Brainard were sent, on July 11th, directly to the northwest, in order to determine definitely the physical conditions of the country between Lake Hazen and Lincoln Bay. They were absent three days, travelling on foot, and were assisted in carrying their packs for one day by Bierderbick and Henry. They penetrated about thirty miles to the northwest, and saw beyond them, in the same direction, about fifteen or twenty miles distant, a very large glacier.

In July occurred the only marked breach of discipline during our two years at Conger. The surgeon, who had declined to renew his contract that expired on July 20th, refused, on the 19th, to turn over to Lieutenant Lockwood his diary, sealed and addressed, for transmission to the Chief Signal Officer. The keeping of such diary, and its delivery to the Chief Signal Officer, was required by a clause of the orders under which the expedition was organized. The final examination of his diary shows his written statement, that it consisted of letters, to be incorrect.

As Dr. Pavy insisted that he was out of service, and refused positively to obey my orders, it became necessary to place him in arrest, with permission to take such exercise as was necessary within a mile of the station. Every consideration was shown him, notwithstanding which he broke his parole. I was unwilling, however, even then, to resort to any extreme measures, and so did not place him in close arrest, trusting that leniency with him would have no demoralizing effect on the party.

By July 29th all arrangements had been made for the retreat, and an order was issued announcing that the station would be abandoned on August 8th if no vessel should arrive. A party was detailed to proceed to Cape Baird with the launch at the earliest possible moment. The launch and boats had been overhauled, and were pronounced by the engineer to be in excellent

condition. Five thousand pounds of carefully selected coal was screened, bagged, and carried to Dutch Island, where the launch lay.

The wisdom of laying her up at that point was then obvious, as the harbor-floe had never sufficiently opened to permit of her being moved had she been laid up for the winter at the station. Other stores and supplies had also been accumulated near the launch.

For the greater part of the year, with my clerk, I had been engaged in reducing, arranging, and copying the scientific observations, which, by August 8th, were completed to July 31st. These records, weighing about fifty pounds, were packed in three tin boxes, which were soldered and thus made water-tight. Two boxes were to be in my charge. These contained original reports, field journals, my own diaries, original sheets of magnetical and meteorological observations, and other official papers. Lieutenant Lockwood was to take charge of the third box, which contained letter-press copies of all scientific observations, star sheets, and the official collection of plants. The work of duplicating these records was great, but I hoped thus to save one set in case of any disaster during our retreat. All private property was abandoned, except eight pounds of baggage for each man and sixteen for each officer. My own extra baggage consisted of a seal-skin jumper, two or three towels, one suit of underclothing, three pairs of stockings, a woollen afghan, and my private collection of plants. Selections by the others were of the same character, being almost entirely articles of clothing, tobacco, etc. As commanding officer I took in addition my epaulets, sword, etc., and at Lieutenant Lockwood's request carried for him a favorite revolver, as he wore another which he had invariably carried in the field.

The pendulum, first secured in its box, was afterward soldered

in a tin case, and later secured against harm from rough handling by a wooden covering, which raised its weight to nearly a hundred pounds. The most valuable thermometers were carefully secured in a strong wooden case, and the magnets were transported in the prism. Four rifles, with about a thousand rounds of cartridges, and two shot-guns, with ample ammunition, were also selected.

The greater part of the men turned in their private diaries, sealed and addressed, which, with forty-eight photographic negatives, were carefully packed in a stout water-tight box. Medical stores designated by Dr. Pavy were handily arranged by Hospital Steward Bierderbick, on whom that duty fell. The medical liquors were also taken in as great a quantity as I felt was possible.

In addition to my own baggage, I also carried needles, bodkins, gimlets, thread, yarn, etc., not only for trade with the Etah Eskimos, if we should reach them, but for our own use. A large assortment of tools of various kinds, and material for repairing boats were also selected, and the outfit of the boats was made as complete as our means would permit. Our complete sledging-gear, which had answered so admirably in the field, was adopted for the retreat, and alcohol for fuel was taken in quite large quantities.

All these and other arrangements were perfected, but still the ice would not open. July ended in southerly gales, which did much toward breaking up the last year's floe in Hall Basin and Robeson Channel. Unfortunately Kennedy Channel did not break up until July 24th, one day after the Proteus sank. Discovery Harbor broke up July 30th, so that it was navigable at times in the southern portion. Time pressed, our fresh meat and vegetables were gone, our fuel nearly exhausted, and everything in an unsettled condition.

It was not, however, a question as to whether I should be obliged, contrary to instructions and expectation, to remain a third winter at Conger. It was true that Archer Fiord yet remained closed, the continuity of its ice broken only by occasional water-pools, but the supplies accumulated on its southern shore in the preceding spring now rendered it possible for me to abandon my steam launch, and with sloops and small boats cross floe and water to Cape Baird. In this frame of mind we impatiently waited for August 8th as the turning point in our fortunes.

The health and condition of the party at that time was extraordinary. But two men, both of whom are now living, were in any way in a state which would prevent active field work. This condition appeared the more remarkable, when I reflected on the past. We had experienced two years of unequalled cold and darkness. Nine months (less twelve days) had been marked by the total absence of the sun, during which the *mean* temperature had been —31.4° (—35.2° C.).

The amount of work done was equally extraordinary. The sun had shone four hundred and fifty-three days, and on two hundred and sixty-two days from one to three sledge parties had been in the field on journeys entailing from two to sixty days' absence and three thousand miles of travel.

Our explorations covered $3\frac{1}{2}°$ of latitude and 45° of longitude, one-eight of the way around the globe above the 80th parallel.

To the northward a latitude never before attained on land or sea had been reached, and for the first time in three centuries England yielded to another nation the honors of the "Farthest North." The end of Greenland, so many times seen, or supposed to have been, was extended at least forty miles northward, and over a hundred miles of new shore, never before trodden by the foot of man, added to its coast-lines.

To the westward the Polar Ocean had been reached by the crossing of Grinnell Land, while the interior of that country had been surveyed, its extraordinary physical geography determined, and the outlines of its northwestern coast fixed with tolerable certainty.

The programme of scientific observations, the main work of the party, had been carried out as far as instruments and means permitted, and in the two years over five hundred observations were made and recorded daily.

The monotony of Arctic life, the depression of months of cold and darkness, the restricted and limited diet, the dangers and extreme privations of winter and spring sledging, had all been experienced without scurvy, without loss of health or limb, without sickness, and without even a serious frost-bite.

This experience proves the possibility of a selected party, under proper management, to endure for a series of years the danger and privation incident to Arctic life and explorations with safety and comparative comfort. The later sufferings and death are properly chargeable, first, to the fortunes of navigation, and afterward to preventable causes.

CHAPTER XXXV.

FROM CONGER TO CAPE BAIRD.

AUGUST 8th came, the day set for our retreat. The condition of affairs is set forth in my journal, from which I shall frequently quote in describing the retreat by boats and our subsequent experiences at Cape Sabine:

"On this day we were to have abandoned this station, but no chance of leaving has yet presented itself. The strong southerly gale, is making water fast, and should clear Archer Fiord. My own observations show that Kennedy Channel is quite clear of ice, as well as the eastern part of Hall Basin. Varying favorable reports have been made by the watch sergeants, up to the present (midnight), but at no time has there been a living chance of the launch crossing the fiord. The entire party are under orders to be ready to leave at an hour's notice."

August 9th.—"Early reports this morning unfavorable, but improved later, and at 10 A.M. I ordered the formal abandonment of the station at 1 P.M., hoping to leave by 2 P.M., when an ebbing tide setting ice northward, will favor our passage."

The last scientific observation was made at 1 P.M., by Sergeant Jewell, who, with Brainard and Long, were left at the station while the launch was being loaded at Dutch Island. Brainard, by my orders, opened several barrels each of seal-blubber, pork, beef, and bread, so that the dogs could maintain life for several months. I regretted exceedingly to leave those faithful animals, to whom we were strongly attached, but they could be of

no use in our retreat. I could not safely kill them, for in case of our return to Conger, through any contingency, they would be essential to us for hauling in our game and fuel.

Three tons of coal remained, which, with our valuable collections and the greater part of the remaining food, were fully protected against the weather by being stored in the house and porches. We abandoned a sufficient quantity of salt meats, hard bread, coffee, tea, and several other articles for a scant year's army rations, not enough for an Arctic ration. Flour, sugar, vegetables, milk, and butter, were entirely gone or remained in very small quantities.

At 2 P.M. the chances of crossing Archer Fiord, if we could once reach open water, were exceedingly favorable and every moment improving. Unfortunately, a belt of heavy closely-packed ice, too dangerous for the launch, had remained crowded against the mouth of the harbor from Dutch Island to Bellot Island, which obliged me to run out by the westward passage.

Leaving Lieutenant Lockwood to complete the loading, I ordered him to join me at Proteus Point, where I proceeded to examine the condition of the ice in Discovery Harbor toward Sun Peninsula. From Proteus Point the preconcerted signal was given to Brainard, Jewell, and Long, who joined me from the station at 3 P.M., with the half-cooked dinner, just as the launch came up with two boats in tow.

We started immediately, with excellent prospects for reaching Sun Peninsula without trouble. The tide was flood, the wind quite brisk from the south, and the indications were that we would reach the western entrance at a stage of the tide just before the ebb, when the fiord would be well cleared of ice.

Unfortunately the deeply-loaded launch and boats made slow progress, and by the time the north side of Bellot Island was reached the water was too low to permit of following the ice-

foot. It was a question as to whether our coal and energies should be expended in advancing. Lieutenant Lockwood was left in charge with instructions to push on, and I proceeded to high land on the island, and saw such favorable conditions as justified all exertions. After seven hours of constant and persistent labor through rough and heavy ice, we reached Sun Peninsula.

Leaving the party preparing some warm food, I went with Sergeant Brainard to a summit overlooking Archer Fiord, where it was evident that a mile further would put us into clear water, which extended to Cape Baird. In the meantime some food had been eaten and several geese killed.

Owing to shallow water we were delayed somewhat in getting into the fiord, and by that time the tide was about flowing. We pushed on, however, and were soon within several hundred yards of clear water, when I quit the launch for a minute to examine the prospects of a lead some fifty yards ahead, which could not be seen from the launch owing to intervening heavy ice. The whole body of ice had commenced moving southward toward the head of the fiord, and the launch not being turned back quick enough, was nipped between two floes of last year's growth. She was caught by the ice in such manner that she came near being thrown on her beam-ends, but was in no great danger of being directly crushed. About a dozen of the party held her as upright as possible, while others quickly transferred to the ice the provisions, coal, etc.

The other boats were drawn up on the floe to await further movements of the ice. By watching and waiting as the ice slowly moved, the launch was gradually worked into a natural dock where she was in a safe condition.

This was our first nip, and at the time it appeared to us a serious and important one; but later more dangerous experi-

ences in a moving-pack relegated it to a minor place among the dangers of our retreat. The staunchness and strength of the launch here displayed gave me renewed confidence in her, and caused me afterward to place full reliance in her when dangerous attempts were called for.

As the boats were safe and the ice too close for further movements, the men, save a sentinel, were sent to their sleeping-bags for the rest they sadly needed. It was now 3 A.M., and for the first time in twenty hours I was able to spare time for food and rest.

About 9 A.M., August 10th, at the turn of the tide the ice loosened somewhat, and after a careful examination of the ice we proceeded, and running southward into Archer's Fiord, succeeded in passing around the heavy ice-fields which separated us from Cape Baird. We reached that point at two o'clock, experiencing during our passage a heavy gale, which continuing, rendered it impossible for us to proceed southward into Kennedy Channel. Our time at Baird was occupied in putting everything in readiness for a move at the earliest possible moment. A cairn was erected, in which was deposited a record stating that the party of twenty-five, all well, proposed to leave for Littleton Island, and perhaps later Cary Islands, that night. At this early stage of our retreat I felt constrained to face the contingency of accident or disaster to the relief vessel. In addition, I left maps showing the extent of our explorations and a notice for any visiting vessel, which stated that our *original* records and the entire collection of natural history specimens were to be found carefully packed in the building at Conger.

I left Lieutenant Lockwood, with instructions to get everything in order, while I visited the high plateau just to the southward of Cape Baird, which afforded an excellent view of

LAUNCH LADY GREELY IN DISCOVERY HARBOR, AUGUST, 1883.

(*From a photograph.*)

the straits. A high southerly gale prevailed, which had driven the greater part of the ice into the northern half of Hall Basin, where it generally consisted of enormous palæocrystic floes separated by occasional pools of water. Toward Discovery Harbor an outlying dense pack was visible, which proved the impossibility of crossing Archer Fiord in any other manner than by our own route—a detour to the southward. To the southward, in Kennedy Channel, the prospects seemed excellent, if we could but get the start of the ice to the northward. The only signs of previous visits by man was the small cairn erected by Beaumont, seven years before, almost to a day, after his extraordinary crossing of Hall Basin with his scurvy-stricken crew.

I returned to the party, which was comfortably encamped at the mouth of a small river where in ages past the hardy Eskimos had likewise pitched their tents. In the immediate vicinity of this spot Sergeant Brainard had discovered the ancient Eskimo sledge (see vol. i., p. 201), ancient stone lamp (see vol. i. p. 420), and other interesting relics of these nomads of the north. As the gale still held the party were sent to their sleeping-bags, while I definitely perfected further arrangements for our retreat. Our means of transportation consisted of the twenty-seven foot navy launch, the Lady Greely, which afforded the motive power for our other boats, which were towed by it. Lieutenant Lockwood was especially put in charge of her, with a crew of six, including engineer and fireman, which, with Lieutenant Kislingbury and myself, raised the number to nine. The remaining sixteen of the party were divided between the three boats in tow; in one of which, the whaleboat, Dr. Pavy went by preference. In case the launch should be suddenly lost an assignment of the party of twenty-five had been made, so as to avoid all possible confusion. In that contingency the whale-

boat (Narwhal) was to be commanded by me, with a crew of eight; the English ice-boat (Beaumont) by Lieutenant Lockwood, with a crew of seven; and the jolly-boat (Valorous) by Sergeant Brainard, with a crew of seven. The assignments were so made that the seafaring men of the party were equally distributed. To provide against disaster to any of the boats, the records, provisions, coal, etc., were as generally distributed as was possible. Thirty-nine bags of coal, aggregating fifty-five hundred and sixteen pounds, were taken as fuel, of which about four hundred pounds were carried in each of the small boats and the same amount in a fourth boat, a small Whitehall, which was taken along for general work as a single man could handle her anywhere in thick ice.

We had over forty days' full rations, with rations for over twenty days cached to the southward of us between Capes Baird and Collinson, which I calculated (and, as it proved, accurately) would enable us to reach Cape Hawks with the same amount of supplies as on leaving Cape Baird. Considering the possibility of our passing southward of Littleton Island with the open north water, a complete suit of canvas for all the boats was taken. This was probably one of the few errors of the retreat, but, if so, it was fallen into by me with a full knowledge of the situation. No one knew better than myself that, in nearly two months' work to the northward of Cape Sabine, the British expedition of 1875–76 had spread canvas but twice. While I realized correctly that canvas never could be used by us until Littleton Island was reached, yet I should not have forgiven myself, even had naval authorities condoned the fault, had I reached open water and been without canvas.

That we were able to leave Cape Baird so thoroughly fitted out was the result of forethought and precision in accumulating these supplies the previous spring.

The gale showed signs of abating about 9 P.M., when supper was prepared and the boats hurriedly loaded. The Valorous, Beaumont, and Narwhal, in the order named, strung out as a tail to the launch, the tow-line of each boat being attached to the stern of the preceding one. The tow-line was in charge of a reliable man in each boat, and could be cast off instantly.

Emerging from the mouth of the river, we steamed slowly along past the row of beautiful stranded floebergs which lined the shores of Cape Baird, keeping, however, a safe distance from these uncertain sentinels, which were liable at any moment to topple and fall seaward. We touched at the extreme point of Cape Baird to take up a final cache of bread. As the midnight sun struggled through the distorted masses of angry clouds we turned our prows into Kennedy Channel—to the southward, and, we hoped, to safety.

We then knew not that one relief steamer was at the bottom of the sea, and that its consort, its commander "convinced that this frozen region is not to be trifled with," was that very day steaming safely southward, with undiminished stores, into the harbor of Upernivik.

And so we turned homeward, knowing we had the courage to face the blinding gale, the heavy floes, the grinding pack, the countless other dangers which environ the Arctic navigator; and having also, though we knew it not, heart and courage to encounter uncomplainingly, on barren crags, the hardships and horrors of an Arctic winter, with scant food, shelter, and clothing, with neither fire, light, nor warmth, and to face undauntedly intense cold and bitter frost, disaster and slow starvation, insanity and death.

CHAPTER XXXVI.

KENNEDY CHANNEL.

AT first open water quite free from ice appeared, which offered an uninterrupted course and caused many hopeful expressions as to an easy journey, but to one familiar with ice navigation no mile is counted good until it has been passed.

The wind had changed to the northeast, and the heavy floes, drifting rapidly southward and crowding against the west shore, cut us off from open water and drove us to a safe harbor in a break of the ice-foot about half way between Capes Lieber and Craycroft. The palæocrystic floe which impinged on the shore was perhaps the largest seen by us. It was about fifteen miles long, as my field diary states, and several miles in width. Very possibly it was the floe over which, between Capes Beechy and Sumner, sledge parties the previous spring could not cross in a day's march.

Fog and light snow set in, which soon wet everything unprotected by canvas. The men, glad to quit the cramped position necessitated by our crowded boat, were soon asleep under the improvised tents on the narrow beach between the ice-foot and precipitous crags which form the coast-line.

About 7 A.M., August 11th, the watch-sergeant informed me that snow had ceased to fall and the ice was moving. I immediately climbed a projecting spur of the high cliffs to the southward, leaving orders with Lieutenant Lockwood to proceed southward and pick me up if I should so indicate. From the hill I

NORTH SIDE OF CARL RITTER BAY, KENNEDY CHANNEL.

(From a photograph.)

could see that we were separated from open water by a belt of quite heavy closely-packed ice of a mile in width. I at once gave the signal to advance. The cooks had commenced the preparation of breakfast, and the rest of the men had been called for the possible movement. Everything was speedily on board the launch, but still she did not move forward for some minutes, during which I impatiently watched the widening belt that threatened to cut us off from the open water, and through which we forced our way with difficulty.

Bessels Bay from Cape Cracroft.
[*From sketch by Sergeant Gardiner.*]

Two hours brought us to Cape Craycroft, where I had cached a hundred pounds of meat and a barrel of bread, the preceding year. The shore-belt of ice at that point was loose, but heavy and in motion, so that it was dangerous to venture in with launch and tow. The prospects to the south were so excellent that I doubted the propriety of either a long delay or the endangering of the boat, so I sent in the Whitehall boat with two men, who brought off the meat.

Kennedy Channel to the Greenland shore was free from ice, and to the eastward Bessels Bay, a long narrow opening with

its cliffs striped with the great inland ice-cap, was clearly visible.

. Shortly after this we saw five narwhals, which was a most encouraging sign as to the open condition of Kane Sea, for the northern range of the narwhal is without doubt coincident with the extreme extension of the free "north water." Two dovekies were shot and picked up without stopping the launch.

We passed Cape Defosse at noon, only to meet with a heavy fog. The truth of Sir John Franklin's remark as to the great extent to which fog enhances the dangers of boat navigation was now exemplified. The launch was slowed down to half speed, for frequent palæocrystic floes made it dangerous to run at full speed. Later we observed many grounded floebergs, and found a shallow bar which extended out from shore for a mile or two. During this time, and later, when running in a fog, we kept a couple of the horns in service, with which we hoped to notify any passing vessel of our presence.

After dodging around the numerous floebergs, and having nearly grounded in the shallow water several times, I concluded to save coal and avoid such danger by seeking land, where we remained several hours on a low sandy fore-shore. Here a meal was cooked, and a few hours later, as the fog cleared, we started southward, at 6 P.M.

Fog and ice were again troublesome, and about midnight, as we had reached a safe anchorage and the weather was yet thick, we stopped and camped. A summer torrent had worn its way through the massive ice-foot, which at low tide rose from eight to ten feet above the boats, so that all were safely harbored. The boats were hauled up on shore, and the launch anchored in a cove and left in charge of the engineer, who said he had some work to do and preferred to look after her for that watch.

I rose at 7 A.M., August 12th, after only two hours' sleep, and

found that the bow of the launch had been allowed to ground on the falling tide. This contingency had been provided for by the detail of a man to assist the engineer. It was an exceedingly serious matter to lose a tide at that point, as it must necessarily entail eight or ten hours' delay. Without losing time to investigate the cause, I immediately set the whole party at work to free the launch. At this juncture special orders, which were given to Sergeant Cross, the engineer, were not obeyed until I most emphatically reiterated them, when the man emerged from under the launch covering and showed himself to be under the influence of liquor. We finally succeeded in getting the launch into such position that we lost only two hours by the neglect. It was evident that Cross had availed himself of the opportunity afforded by the party being asleep to appropriate some of the fuel alcohol. He had been guilty of similar conduct on previous occasions, but had promised reformation. Occupying, as he did, the responsible and important position of engineer, his unwarrantable breach of discipline at such a dangerous crisis evidenced an intention on his part to presume upon his then indispensable services, which augured ill for future good behavior and reliability. To replace him by an untried man in the middle of such a perilous voyage seemed a greater risk than to retain him with a vigorous reprimand. My field journal appropriately says: "It is difficult to determine what is the best course to pursue with such a man, who, relying upon his position, thus tampers with the safety of the entire party."

We got away at 9.30 on August 12th, and stopped, after a difficult run of several hours, on the north side of Cape Back, just south of the 81st parallel. We were obliged to follow the ice-foot quite closely, owing to the foggy weather and the large amount of moving ice in Kennedy Channel. The run

was made through loose streams of heavy ice, which demanded constant watchfulness and prompt action to avoid disaster, if not destruction. Orders given to the engineer were badly executed during this time, which augmented our danger and several times resulted in the nipping of the boats. On two occasions the boats were cast off from the launch and drawn up on heavy floes. At 2 P.M. I stopped a few moments to examine the ice from an adjacent cliff, and, finding the route somewhat more open, sent the engineer to bed and replaced him by Private Frederick, who had on occasion been charged with the duties of engineer. Under his management our progress was much more satisfactory. Snow setting in, and the weather becoming very thick, I sought a safe break in the ice-foot, which proved to be near Cape Back. This was the first time since we had left Cape Defosse that we were assured of our exact locality, as the thick weather had prevented observations or any extended view.

The weather cleared somewhat a few hours later, and the first fine run was made. Cross, having recovered himself, was again in charge of the engine; Frederick being worn out with his long tour of duty, first as fireman and then as engineer. The cache on the north side of Carl Ritter Bay, made by me in 1881 on our way to Conger, was visited, and its two hundred rations taken up.

On leaving the cache I decided to run direct for Cape von Buch, although Lieutenant Kislingbury urged strongly that I follow the coast-line closely along the whole extent of Carl Ritter Bay. The run was made successfully, touching but a single belt of ice and avoiding large masses of shore ice, which, under the influence of the ebbing tide, was moving out of the southwest part of Carl Ritter Bay, and would have obstructed a circuitous shore passage. To the southward of Cape von

Buch open water, with only sailing ice, was found until ten miles southward, at 2 A.M., August 13th, farther progress was rendered impossible.

We came to what was apparently an unbroken pack of immense palæocrystic floes of great thickness. A mile from shore an enormous floeberg, which reached some sixty feet above the water, had grounded, and from this to the shore extended a single unbroken floe. We were fortunate in obtaining an unusually well-protected harbor at the mouth of a ravine, where the broken, wasted ice-foot permitted the small boats to be hauled inside, while the launch was entirely safe except at extreme low tide. Snowy weather then prevailed, which dampened the clothing of the men and rendered their cramped positions in the boats intolerable, while the strong southerly gale and low temperatures chilled every one to the bone. For the first time I deemed it advisable to issue an allowance of rum. The formation of the shore at this point was very steep cliffs, which were only separated from the ice-foot by a sloping talus of disintegrated rock, on which the party arranged themselves for sleep under circumstances which afforded comfort only as a change of evils.

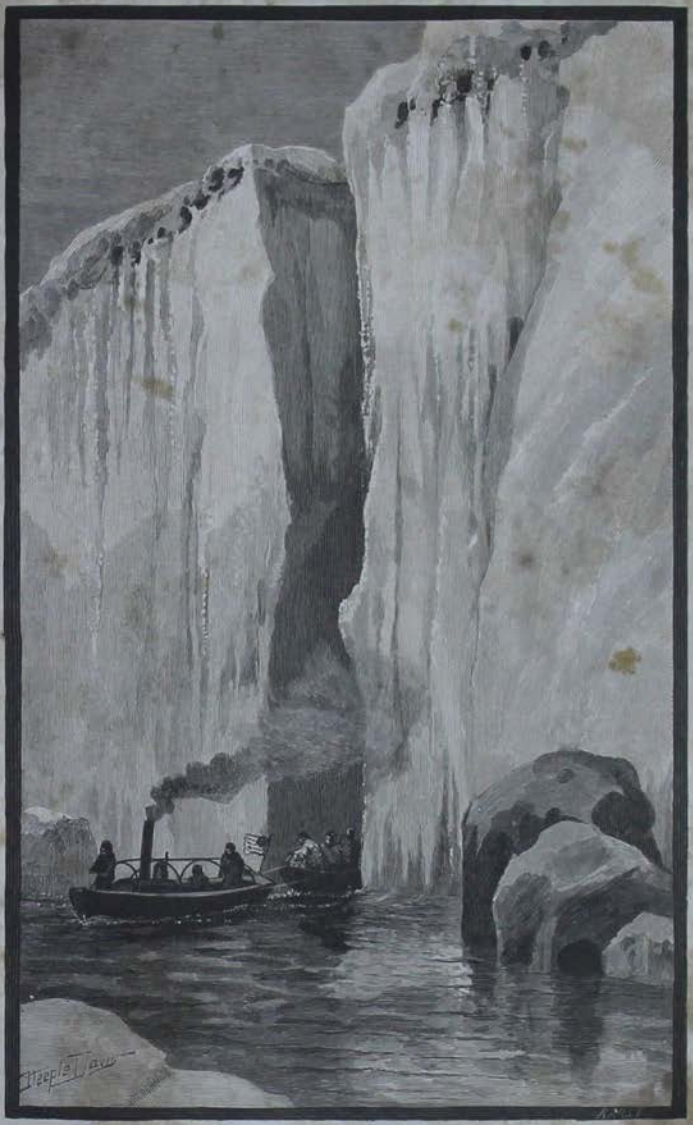
At 8 A.M. a warm breakfast was served, after which Lieutenant Lockwood with Jens visited a cliff about two miles to the southward, from which the shore could be seen a mile farther. He reported nothing but ice, with no possible chance of advance, and expressed his opinion that the pack to the southward had not broken during the summer.

The condition of the ice above precluded this idea, and after the turn of the tide I sent the watch (Sergeant Brainard), with the small boat, to examine the floeberg and ascertain our chances of passing it. On his return he reported it to be the key of the situation, and that only a slight change in the ice was

necessary to permit us to pass to the southward of it into a narrow lead of water which extended southward to the next cape.

A second trip revealed a mere possibility of passing to the southward, and everything being in readiness we moved to the floeberg. The passage hoped for was just too small to admit of the launch, but on farther examination we found that the floeberg, which seemed whole from shore, had, since grounding, split and separated. The narrow cleft presented to our view afforded perhaps the most wonderful passage ever traversed by any voyagers. Scarcely a dozen feet wide, it was over a hundred yards long, and its perpendicular walls of opaque ice on each side reached full fifty feet skyward above our passing boats. I recall no other weird mass which has so impressed me with the grandeur and scope of nature's forces and works. Its slow growth had probably required a thousand years before the falling snows of the Arctic sky, accumulating, flake by flake, on the plateaus of a glacial continent, had attained such weight and thickness as changed it to ice. Later, through ages, this huge bulk, slowly moving seaward, broke from its parent mass in the Polar Ocean, and in the past years had floated southward and stranded here. Its million cubic feet of ice might well be thought impenetrable and capable of infinite resistance, yet the stress and motion of countless smaller floes had broken it as though it were a bit of chalk.

A short run brought us to the northeast point of a curve in the coast, a bight which was hardly deep enough to be called a bay. To the southeast the ice was close, dense, and impenetrable. The wind commenced to blow hard, heavy snow fell, and the prospects were dismal and discouraging. There was no protection for the launch, for the ice-foot as we travelled south was growing higher and higher, and was now from ten to twelve



A WONDERFUL LEAD THROUGH A SPLIT FLOEBERG.

feet above the boats. At one place was a slight break, where in extremity a small boat could be hauled up.

It was noon, and all were sent to their bags except the watch. I could not sleep, however, and remained up observing closely the changing ice conditions, while the men, wet and chilled, got what rest they could. The sail we had was needed to protect the bread against the snow, and the men sacrificed willingly their own comfort to secure the provisions. By 2 P.M. affairs looked desperate, for the heavy ice, which, under this strong southwest wind and ebbing tide, was moving rapidly northward a few hundred yards out, showed ominous signs, as the low water came, of closing in upon us. In the meantime I had carefully examined the ice to the southward, and determined the moment the tide turned and the ice loosened I would push down the bight along shore, and, finding secure anchorage at the southern entrance, await favorable weather to get farther south.

The question was, would the ice hold off that long, or would it close in and grind us to powder, save such boats as we could haul up. I kept one of the watch on the hill, with orders to advise me the instant any signs of the pack loosening should be noted. With the other man I kept a close eye on the pack, for I was reluctant to rout out the men, whose wretchedness and discomfort were already sufficiently great.

The tide turned a few minutes after two o'clock, but the southwest wind held the ice well up until the tide was in its full flow, about 4.30 P.M., when, as affairs were reaching their worst, I was much relieved by Whisler announcing from the hill that a lead was opening into the bay. It was none too soon, for the same stage of the tide that was clearing the bay brought down on us the entire pack.

Everything was ready for instant movement, but even as we started we were caught in heavy ice, which handled us very

roughly. In a few moments we were safe in the bay, when the struggle of crossing it commenced. By tremendous exertions, and, by taking serious chances, we succeeded, by 7 P.M., in reaching a point within a quarter of a mile of the southern cape. We were checked, however, by the wind, which, changing to southeasterly, crowded the whole pack against the shore, and rendered farther progress impracticable. We were perfectly safe, however, as the bay was shallow and fully a hundred floebergs were stranded, which relieved us from any direct pressure. In crossing the bay a small seal was shot, by Lieutenant Kislingbury, I think, which was cooked for supper; the men, with but one or two exceptions, eating it with relish. During this run Sergeant Cross was repeatedly guilty of mutinous, insubordinate, and disrespectful language, none of which was directly addressed to me. He appeared to take pains to make everything go wrong with the engine, and obeyed orders only when repeated. His services as engineer at that time being necessary, I reprimanded him twice most severely.

A northeast wind prevailed during the night, driving the pack rapidly to the southwest. At 8 A.M., on August 14th, Kennedy Channel seemed clear to the north. To the south only occasional lanes of water could be seen; elsewhere a vast expanse of heavy, crowded ice, too heavy even for a vessel. My journal says: "Latitude 80° 44′ N., 4 P.M.. The ice has been watched very carefully and anxiously all day. Occasional gleams of hope sprang up as the wind lulled and went to the south-southwest, only to spring up with greater force from the northeast. Clear weather at times gave us a fine view of Hans, Franklin and Crozier islands, as well as of the Greenland coast from Morris Bay northward. I do not wonder that Morton could not scale Cape Constitution, if it is as steep as it appears—a sheer naked wall of rock. Ralston shot a knot and

Ellis a turnstone, the only birds lately seen. Lieutenant Kislingbury, with Christiansen, went hunting in the interior last night. He reports a narrow desolate valley, with no vegetation, running at right angles to the coast for a mile or two, and then trending northeast parallel with Kennedy Channel. They went five miles up the valley, saw two small lakes, and observed

Lieutenant F. F. Kislingbury.
[*From a photograph.*]

a depression beyond that betokened a large lake. These lakes were yet covered in the centre with last winter's ice, which indicates that they are permanent. They were fed and connected by a small stream which, probably springing from a glacier, discharges into Kennedy Channel near our camp." On the principle of associating his name with his own work, I have affixed

Lieutenant Kislingbury's name to the valley and river, instead of placing it elsewhere.

"August 15th.—The temperature sank last night to 21° (−6.1° C.), and new ice formed to the thickness of an inch and a half. This cold weather caused me such uneasiness that I slept but little. About 9 A.M. I determined to get the launch off shore, and as near the moving ice as was consistent with safety, fearing that otherwise new ice forming so fast would imprison us, and oblige its abandonment. With great difficulty we managed, by 3.30 P.M., to get the launch within four hundred yards of the moving ice, in a harbor where she was completely protected by grounded floebergs. While we were getting her out, Cross, the engineer, used insolent and insubordinate language again. Everything went wrong in the engine-room. My orders were neglected, or ignored until repeated, although their prompt execution was especially important. Finally, an order not being obeyed on its emphatic repetition, Sergeant Brainard reported that Cross was intoxicated. I went to the engine-room, saw that he was drunk, and at once relieved him, sending him ashore and ordering him not to enter the launch again except by special authority. I put Private Frederick in charge of the engine, with orders not to permit Cross anywhere near it. A man who has so misconducted himself in such critical circumstances cannot be trusted in any way. It is evident that he became intoxicated on our fuel alcohol, some of which he must have stolen and concealed several days since, as the supply has been kept out of his reach since his last intoxication. It is impossible to watch the alcohol cans constantly, and they must be kept at hand now for cooking purposes.

"Lieutenant Lockwood, in the course of the evening, got the boats within one hundred and fifty yards of the launch, in a place perfectly protected by grounded bergs. Unless the ice

changes materially, we shall be able to leave this point without difficulty as soon as the strong northeasterly wind dies away. The temperature has remained below the freezing point (0° C.) all day, and now (12 P.M.) stands at 26° (—3.3° C.). Brainard asked permission to go to Cape Lawrence to see if there was any vessel in Rawlings Bay, as many thought. I told him it was unadvisable to separate the party for such a distance."

"August 16th.—Still detained by a strong northeasterly gale, which keeps the channel jammed with ice; but few pools of water have been visible to-day. The dense mass of ice moves steadily southward, though with diminished velocity during the ebbing tide. It is fortunate that I decided to move yesterday to our present position, as the low temperature has made new ice so rapidly that nothing could have been done to-day. The men are uncomfortable, and there is some complaint that we left the shore, but such action is our only chance of escape. A high north wind, which has prevailed all day, with temperature ranging from 26° (—3.3° C.) to 28.9°(—1.7° C.), has chilled and benumbed every one. Rum has been issued, a half gill to each man, in consequence."

"August 17th.—Still ice-bound in the same place, 80° 44′ N., 68° W. Three inches of snow fell during the night, occasioning much discomfort to all; but now, 8 A.M., the sky is clear and the wind light, so that the men's spirits have much improved. From the grounded bergs, twenty feet high, no water can be seen in any direction. Ellis and the Eskimos went ashore last evening, and saw a belt of water five miles wide along the Greenland shore. If a southwest gale should spring up it would set us free immediately. The temperature sank to 23.2° (—4.9° C.), the lowest temperature, I think, ever observed thus early in August. The ice is increasing rapidly in thickness, and unless the channel soon clears we shall be obliged to aban-

don our launch. Such a course precludes the possibility of returning to Conger by boat. Our course has been so circuitous, owing to unfavorable ice conditions, that we have been obliged to travel over two hundred miles to make these sixty miles of latitude. We are burning eighty pounds of coal daily on the launch, keeping her fires banked."

"August 18th.—Still ice-bound at 2 P.M. The boats have been sheltered under stranded floebergs two hundred yards nearer the moving pack than the launch; I moved the latter this morning as close to the boats as could be done without losing distance from open water, which now is to be seen in broad lanes. The temperature was down to 24° (−4.4° C.), and has touched 32° (0° C.) only two hours during the past four days. The young ice has rapidly increased in thickness, cementing into one mass the old floes, and rendering movement in any direction very difficult.

"Evening.—At 3 P.M. the floeberg to which the small boats are anchored, suddenly split in two pieces. It caused much alarm and commotion, but did no harm. I decided to make a desperate attempt to force and cut a way through the solid pack, and place the launch in the first lead possible. It was a perilous plan, which no one thought could succeed. Nearly two hours' hard work accomplished little, save to lose an axe and thoroughly discourage the men. As soon as supper was over, despite some covert criticism, I renewed the attempt, sending Sergeant Brainard in the meantime to examine the ice to the southward, where he found it hopeless.

"Four hours' cutting, charging, rolling, etc., worked wonders, and, as the result of our exhaustive labors, the launch was got to open water a few minutes since (10.30 P.M.), where I am impatiently awaiting the small boats to push forward into the open water to the southward before the tide commences to

ebb. The temperature remains steady at 29° (−1.7° C.), with light snow.

"We started again at 11 P.M., all much relieved to be once more in action. I unfortunately fell overboard this morning. I had been on the bow directing the course of the launch through sailing ice, and on reaching open water started back to the engine-room. The spars, covered with light snow, afforded an indifferent foothold at best, but my wet Eskimo boots took no hold and a slight lurch sent me overboard. As I came up Lieutenants Lockwood and Kislingbury caught me and pulled me on board."

We had a fine run of four and half hours, when we were forced to a secure harbor about eleven miles north of Cape Lawrence, between some huge stranded floebergs. We gained harbor just in time. Sergeant Brainard's diary says: "The tide, having changed, came charging down on our frail boats with the speed of a race-horse, and we barely escaped to a small harbor, which was protected by grounded floebergs. I never saw ice move with greater rapidity. Within two minutes of the time we left the open strait its surface was a whirling, turbulent mass of heavy ice, which would have ground our boats to atoms."

"The tides at that point are very heavy, evidently from twelve to fifteen feet in the spring. A lead showing up, we had a run of two hours this afternoon, and just missed reaching Cape Lawrence. As the tide turned, a strip of pack-ice about a mile wide separated us from open water to the south. We made a bold push, but the lead closed on us, and we were forced a couple of miles northward, and obliged to seek instant shelter. A few hundred yards from shore the engine blew out a piece of packing, and we had to tow the launch in by boats, reaching the ice-foot in the nick of time, just as the ebbing tide was moving

the ice rapidly to the north. Later we ran along the shore an hour, but, meeting sludge-ice closely packed, concluded that it cost too much coal, so made the shore seven miles to the northward of Cape Lawrence."

"August 19th.—Private Frederick reports that the engine was in exceedingly bad condition when he took charge. He has been devoting every spare moment to setting matters right, and now reports everything in excellent working order, though not in perfect condition for lack of tools and material. Sergeant Brainard and Eskimo Frederik have just been sent (8.45 P.M.) to Cape Lawrence to observe and report upon the condition of the ice to the south. If we move with next tide (the ice is now densely packed), we shall follow the ice-foot and pick them up. They were accompanied by Dr. Pavy, who requested permission to go. The Psalms for the day were read previous to their departure."

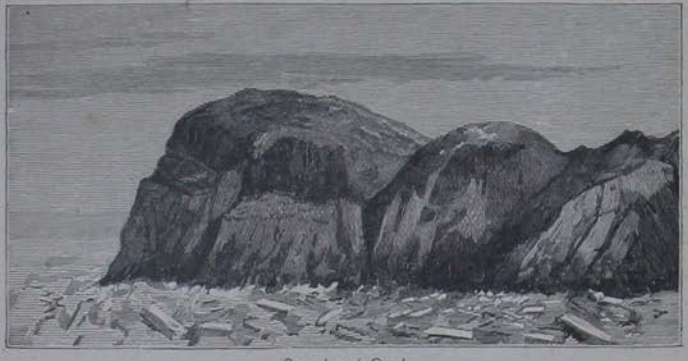
"August 20th.—A lead showing up, we started at 4 A.M. Strong southwest winds prevailed, which retarded our progress, but cleared the ice from the coast. Dr. Pavy and Sergeant Brainard were picked up about three miles north of Cape Lawrence. Their report was most discouraging. From the summit of Cape Lawrence they observed an impenetrable pack, extending from Cape Lawrence across Kennedy Channel to Cape Jackson, with no water in sight. They had very little confidence in our chances of getting south for some time. On this report I sought a secure harbor between two grounded bergs, a mile from Cape Lawrence, and directed breakfast to be prepared. In the meantime I proceeded to Cape Lawrence, and from an elevation of two hundred feet saw broad lanes of water to the southeast and south, the heaviest ice being in Rawlings Bay. This experience confirmed me in my previous opinion, that ice conditions cannot be foretold for any length of time,

but depend almost entirely, at this season of the year, on the action of the wind and tides.

"I returned in haste to the launch, and immediately started, but stopped in Rawlings Bay, half way between Cape Lawrence and Radmore Harbor, on account of the dense fog, which, with the rapid adverse tide, made advance dangerous.

"A massive perpendicular ice-foot twelve feet high extended along the shore, on which we drew out the Valorous for slight repairs. The fog showing signs of breaking, I walked up the north side of Rawlings Bay to the point overlooking Radmore Harbor, and from a considerable elevation saw an immense palæocrystic floe of many miles extent moving out of the bay, leaving clear water behind it from that point to Cape Joseph Good. I hastened back to the launch to find her just grounded, although stringent orders had been given to keep her clear, and two men had been detailed for that special purpose. The strength of the entire party was inadequate to get her clear, and she is now high and dry awaiting the next tide. High water at 12 M., and low water at 6.13 P.M. The range of this tide was nearly fourteen feet. In this bay, I believe, the Alert was caught by a similar tide, in 1876, and was pushed ashore by a floe. It was owing to my recollection of that event, and our own experience a few days since, that I had given such stringent orders regarding the boat. The chance of crossing a bay of this extent does not present itself at every tide. The watch sergeants, however, claimed that the strong tide, which was ebbing an inch a minute when the launch grounded, rendered futile their efforts to keep the launch out from the ice-foot, and other help was called too late. An ivory gull, several seals, a fox, and the dung of musk-oxen (the latter very old) were seen by me near by. Vegetation along Rawlings Bay is quite luxuriant for the latitude, and resembles very closely that around Discovery Harbor."

North of Cape Lawrence Sergeant Brainard found the skeleton of a young reindeer. Christiansen said the animal could not have been dead more than two years. Near the cape Brainard also discovered traces of Eskimo encampments, to all appearance of the same age as those near Fort Conger. They were probably made by summer visitors from the permanent habitations discovered by Feilden, at Radmore Harbor, a few miles to the westward. The deer, musk-oxen, and seal (the latter, owing to the strong tides keeping Kennedy Channel open)



Cape Joseph Good.
[*From sketch by Sergeant Gardiner.*]

for a few years, doubtless, afforded ample food for the ancient Eskimo, who, even children of the ice as they are, could not long abide in this region of almost eternal ice and darkness.

We lost five hours through the launch grounding, but two hours' steaming through clear water took us to Cape Joseph Good, though we were obliged to make a detour inward nearly to Radmore Harbor. Solliffe glacier was veiled in mist. I doubt not it is an offshoot of Mer de Glace Agassiz, as the two small glaciers discovered by Brainard north of Cape Lawrence must also be.

While crossing Rawlings Bay Sergeant Gardiner made a sketch of the bold, rugged headland, Cape Joseph Good, which exactly resembled Cape Lieber as sketched by Hayes, except the high pointed peak in the background, which is like no mountain-top ever seen by me.

The general opinion of the party fixed on this point as the farthest of Hayes. The details of his journey, the similarity of landscape (Mount Beaumont answering to Mount Parry), his inability to see the Greenland coast, the closeness of the longitude, and the extent of open water all tend to confirm this idea.

There are good grounds for thinking that the ice near Capes Lawrence and Good not only forms very late in the autumn, but breaks up correspondingly early in the spring. The velocity of the tides is very great, and in the spring the floes necessarily rise and fall from ten to sixteen feet every six hours. Such tremendous and violent changes, occurring four times daily, must render the formation and duration of a continuous floe exceedingly uncertain in the southern part of Kennedy Channel.

In view of these facts, I consider spring sledging along the shores of Kennedy Channel as by no means practicable every year; indeed, only so after winters of extreme severity. There are good grounds for believing that Hayes could not pass northward in May, 1861, and we know undoubtedly that Bessels was turned back April 5, 1872, just south of the 81st parallel, on the east side of the strait. Not only was travel impracticable along the shores, but open water extended southward in Kennedy Channel as far as could be seen.

Theoretical travel in Smith Sound will ever prove a delusive and dangerous basis for future voyagers who venture into its perilous waters. The only sound premises must rest on the ice conditions actually observed by previous navigators, and their careful consideration cannot be too strongly advised.

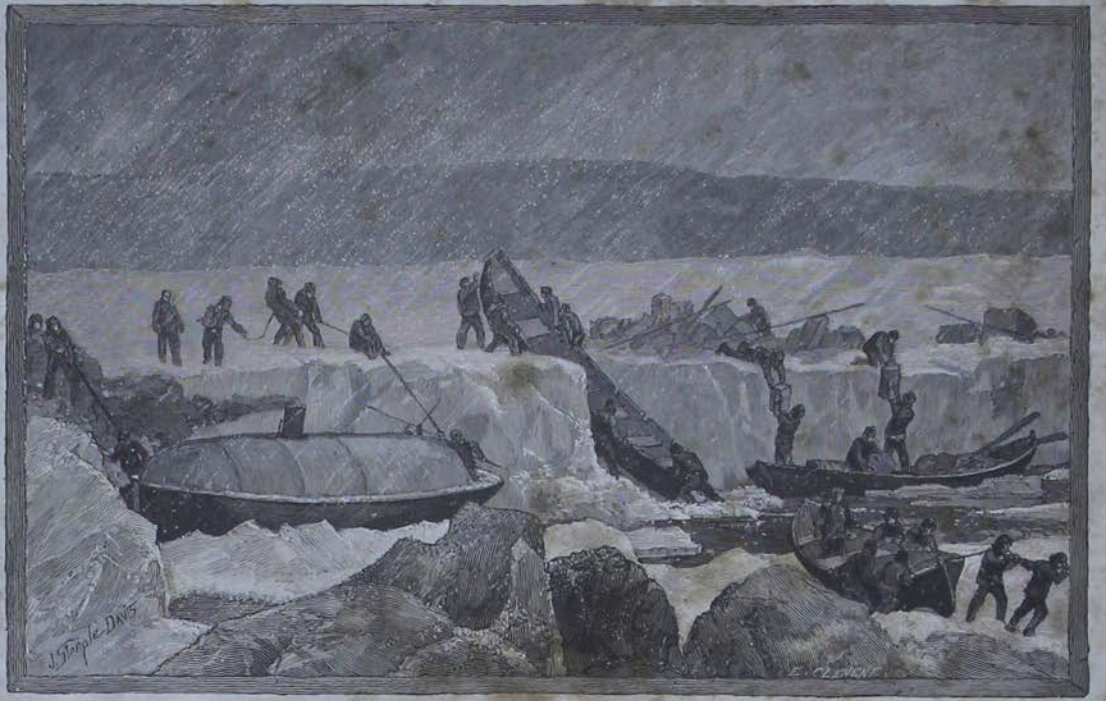
CHAPTER XXXVII.

RAWLINGS BAY TO CAPE HAWKS.

AUGUST 21st an adverse tide drove us, just south of Cape Joseph Good, to an insecure harbor. Sometime later we moved a short distance south, and improved our anchorage. Here we broke up the Whitehall boat, which leaked badly, had been a heavy drag, and only of occasional use. I held on to her, contrary to advice, until we crossed Rawlings Bay; she was so easily handled by two men that I thought it important to keep her as long as we could. At our first harbor here we came near having a bad nip from an immense palæocrystic floe which set well in to the shore. The launch was grounded a short time at extreme low tide. Bear-tracks were here seen in new snow, and on the 20th some birds, probably falcons, were heard.

Sergeant Jewell was sent to Cape Wilkes, from which he observed much open water on the south side of Richardson Bay. Shortly after an opportunity of reaching Cape Wilkes presented itself. Water opened up to the next point south of us, and the entire pack, under the influence of the southwest wind, moved off shore.

We had, however, gone scarcely a half mile when the ice set violently in toward shore, nearly destroying the launch and boats. The tide being low, the boats were caught between the moving pack and an ice-foot ten feet high; as there were no breaks in the ice-foot, the launch was badly jammed, and for



A SERIOUS NIP.

a few minutes I feared that we would lose her, but the coolness, energy, and desperate exertions of all prevented such a serious disaster. The other boats were slightly injured, but not to such an extent as was naturally feared. One of them was pulled out on the moving pack, but the other two were secured along the ice-foot.

The ice in general consisted of last year's floes, interspersed with small rubble, such as would not have been dangerous for a ship, but was exceedingly so for small boats. The launch was well able to endure the direct pressure against the ice-foot; but the moving pack tended to drag her along the ice-foot, threatening to strip her side and destroy her smoke-stack against overhanging and projecting floes. Fortunately, by prompt action and extraordinary exertions, we succeeded in holding her in a slight break of the ice-foot, where she received no serious damage.

During this nip I was obliged to devote my entire attention to the launch, leaving each boat to care for itself. Brainard, Rice, and Connell, who were in charge of the respective boats, justified the confidence I placed in them by their excellent conduct. Lieutenants Lockwood and Kislingbury materially assisted me with the launch, which was of course the most important of our boats. The movement of the pack inward was caused by the sudden shifting of the wind from the southwest to an easterly quarter, and, as the tide was ebbing rapidly, the direction of the pack was immediately changed. On examination it was found that the boats, although more or less strained, leaked very little.

We were delayed here for several hours, but, by watching closely and taking chances, managed to get into the northeast point of Richardson Bay just after noon. Two hours later we succeeded in crossing, with much difficulty, by making a long detour westward into the bay. Young ice had formed of such

thickness as to cement together the small floes, and was itself sufficiently strong in places to prevent all progress.

It took an hour to get the launch through some three hundred yards of new ice, and at times it became necessary to drop all the boats. Near the middle of the bay we found two large floes, separated by a narrow channel about one hundred yards long, covered with new ice. By dint of great exertions we succeeded in breaking our way through it, and as we passed the two floes pressed together. On reaching the south side of this bay it was difficult to determine which point was Cape Collinson, and, in order to make certain of finding the English cache, I made the nearest land and sent Lieutenant Kislingbury and Private Henry to the first point west, while others examined the cape to the east. Nothing was found of the cache, but Henry picked up a small piece of pine wood and saw traces of ancient Eskimo encampments. Shortly after the flowing tide brought down on us such a quantity of heavy ice that we were driven to harbor near Cape Collinson, in a small bay where there were many grounded bergs, near an ice-foot which was twelve feet above low water.

Sergeants Brainard and Jewell, who made one of the parties sent in different directions, found the cache made by Nares in 1875 near Cape Collinson. A small cairn, without a record, was found near the stores. Brainard reported that the cache had been disturbed. The disappearance of a barrel of bread puzzled me, as the barrel had fallen apart, while the staves and head were intact, except a single stave broken crosswise. There were no marks of violence on any of the staves, nor claw-marks such as might have been expected if it had been broken up by a bear. The tobacco, sugar, and tea were all missing. The rum-cask was found bung downward, with a flaw in it which explains the absence of the rum.

August 22d.—About 1 A.M., at the turn of the tide, the heavy drifting ice threatened serious harm to the launch. The water flowing over the ice-foot enabled us to get the small boats inside it, but the launch of necessity remained outside. The three grounded bergs which had been relied on to protect her floated at high tide, and came near proving her destruction. I remained on watch giving directions until the falling tide, at 2 A.M., grounded the bergs and left the launch safe, when I got into my sleeping-bag quite worn out, leaving orders for Lieutenant Lockwood to run over to Collinson at 4 A.M. if possible. About 5 A.M. the cache was reached and taken up. It consisted of two hundred and forty rations of meat, salt, pepper, onion-powder, and fuel, and one hundred and twenty rations of bread. The rapidly falling tide came near grounding the launch twice while taking up the cache. On rounding Collinson a strong southwest wind was met, with much ice running north, obliging me to make harbor. In running in we struck a piece of old ice, and the shock disconnecting an injured collar of the feed-pipe, we delayed two hours to repair this and cook a warm breakfast.

During this delay Lieutenant Kislingbury went ahead and looked into Joiner Bay, the chances of crossing which he reported to be unfavorable, owing to the great amount of packed ice. High wind, fog, and snow prevailed for several hours. As soon as slack water came we started, taking the outside passage, which proved successful. This course was a hazardous one, but I felt obliged to follow it notwithstanding the advice of my officers, as we could not delay two or three tides for the bay to clear of ice. We had now reached such a point, the 80th parallel, that we were considerably nearer to Littleton Island than to Conger, and it was essential to push on with the greatest possible rapidity, taking dangerous risks rather than

venturing the chances of being frozen in by the new ice which now formed nightly.

We were stopped again, about noon of August 22d, by a dense pack a mile north of Cape McClintock, being, as my journal says, "in latitude 79°, a fact which is very encouraging." The pack moving slightly I shifted our anchorage to a point where we were protected by three large grounded floebergs, which afforded a natural harbor just large enough for the launch and boats.

The rising tide caused the ice-anchor of the Beaumont to slip, and she drifted out on the ebbing tide to the northward just as I chanced to espy her, the watch-sergeant at that time having his back turned. I immediately started the steam-whistle and sent the whaleboat after the Beaumont, which was brought back in a few minutes, all her crew being asleep when she was boarded.

From the lookout on the bergs, it could be seen that even against the flowing tide the southwest wind was driving large quantities of ice out of Scoresby Bay.

The wind lulled, and at slack water, about 4 P.M., we ran south into Scoresby Bay and stopped to reconnoitre.

From the high shore I observed several immense floes, which obliged us to make a long detour inward to cross Scoresby Bay, but we found clear water all the way. In two hours we reached a point just south of Cape Norton Shaw, where a large amount of packed slush-ice stopped us. After a short delay I tried a small lead, but a large floe moving in ahead of us jammed between some grounded bergs and the shore and cut us off. A second lead resulted in a run of a mile, though poor shelter for our boats and a threatening pack necessitated our giving way a quarter of a mile to a point which was in 79° 49′ N. The pack moved slowly about noon of the 23d, obliging me to

scatter the boats for shelter to slight breaks of the ice-foot behind grounded floebergs. My journal says: "We are now pressed against the ice-foot by the pack, which will doubtless move when the tide turns. To the southward present prospects are very unfavorable, there being much rubble and small ice packed closely, with no motion even during mid-tide. This jam may possibly be caused by our proximity to Cape Frazer, where the northern and southern tides meet. I cannot understand why no ship has been sighted. We shall be in an unenviable position if we reach Cape Hawks and find none. The season is late, our coal nearly gone, and food entirely uncertain."

High water occurred at 2.15 P.M., shortly after which the pack moved off shore leaving a fine lead, which resulted in an hour's good run, though over a tortuous course. We were finally beset, while trying to make a harbor, in a pack of pancake and sludge-ice, a half mile off shore. During the ebbing tide the pack at first drifted northeastward a little, but shortly afterward the drift changed to the south, owing to an immense floeberg, which was carried steadily in that direction by an undercurrent.

August 24th.—We drifted slowly southward until slack water, when we succeeded in reaching the ice-foot, finding, however, a very poor shelter for the boats. At 9 A.M. a strong northeasterly wind set in, and with great difficulty we moved the launch and one boat five hundred yards to the south to an excellent shelter, which was inaccessible when we first reached the ice-foot. Two boats, unable to move, were obliged to remain behind. High water occurred at 8.30 A.M. It was noticeable that the morning tide both flowed and ebbed from the southeast. I expected the tide would flow from the south, but coming as it did from the north, with the northeast wind, the entire pack set in upon us and came near destroying two boats,

56735

the Narwhal and the Valorous. They were hauled up a small break of the ice-foot, by which a small hole (easily repaired) was made in the whaleboat just above the water-line. Snow and fog here set in, wetting everything and making every one very uncomfortable, as the temperature was at the freezing-point (0° C.). Jewell was sent to the next cape, to the southward of which the ice was heavily packed as far as he could see.

"August 25th.—Just after the turn of the tide, at 4.30 this morning, the ice loosened somewhat, and we succeeded in making a good run of two hours, though obliged to follow closely the ice-foot. When stopped by the dense pack we found shelter for our boats behind stranded bergs. About nine o'clock we ran a mile into the channel, and moored to a flat-topped floeberg with a gently sloping surface on the north side. I was much surprised to see this berg grounded such a distance—a mile—from shore. We obtained from this floeberg plenty of good water to replace the brackish water taken this morning from a berg near the shore."

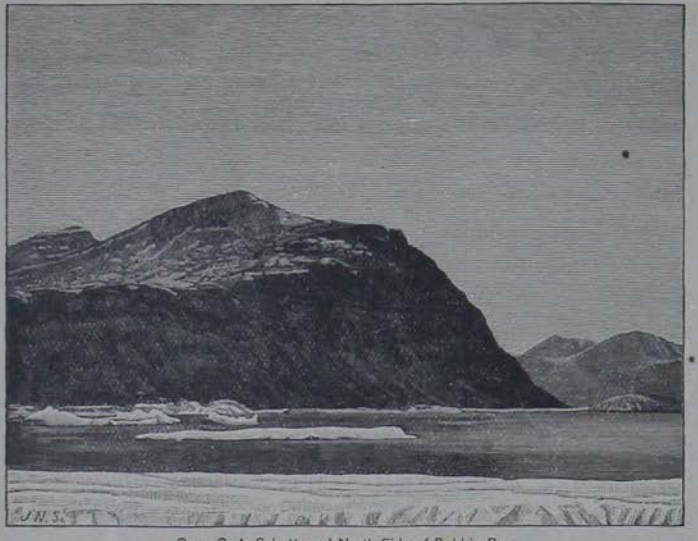
In mooring the launch struck "head-on," not heavily, but enough to start a collar which was in bad order. The heavy boiler is unfortunately loose and unbraced, and acts like a ram when any direct shock comes. The collar-pipe was repaired by Fredericks after much labor, being in such a condition as taxed sadly his ingenuity. Sergeant Israel's noon observations placed us in latitude 79° 45′, just north of Cape Frazer. Christiansen shot a seal in the morning. Several of us drank of the blood, which to me had a taste very much like the whites of eggs. The tide ebbed to the north, but the flow came from the south, and, with a southwest wind, set a field of large floes against our grounded berg, which floated off to the northeast. We were consequently driven to shore, and anchored behind some enormous

floebergs, where we very patiently watched a large lane of open water, which slowly made from the south after the flowing tide set in.

Dobbin Bay, inside of Joy Point: 11.30 P.M., August 25th.—About 6 P.M. fog commenced forming, and, as the shore-ice was crowding in and might eventually cut us off from a run, I determined to force the boats into open water, although sensible of the danger. With great difficulty we bored our way through the moving pack and reached Hayes Point, where a dense fog and heavy ice drove us to shore. While supper was being prepared I ascertained, from personal observation, that there was open water a half mile south. The moment the fog lifted, about 7.30 P.M., I ran around a number of immense grounded floebergs and reached good water. The fog remained thick, but occasionally the top of Cape Louis Napoleon was visible, so that we continued on our course. About 10 o'clock we ran up to a grounded floeberg, from the summit of which, through the breaking fog, I had a good view southward. The pack consisted of very large but quite open ice, which would have been safe for any steam vessel. With our small launch, considering the prevailing fog and our proximity to Cape Hawks, I did not think it advisable to take the chances, and so I ran to the shore inside Joy Point, where we were cut off from clear water, near Cape Napoleon, by the miserable little corner of a grounded floe only three feet thick and twelve feet across. I set a party at work cutting off as much of the floe as was possible, hoping that the rising tide would enable us to pass inside of it, and sent Sergeant Jewell, with two men, to Cape Napoleon, with orders to look into Dobbin Bay, where every one counted on the presence of a relieving vessel.

I went to bed at midnight, ordering the watch to call me the moment the ice moved or fog lifted.

About 2.30 A.M., August 26th, the sergeant of the watch awakened me, and reported that the ice had opened so that an outside route was practicable to Cape Louis Napoleon. As soon as steam could be raised we started and reached Cape Louis Napoleon, having picked up the reconnoitring party en route. Sergeant Jewell reported that, owing to the heavy fog, they had been unable to see Cape Hawks. Many large floes, with occa-



Cape C. A. Schott, and North Side of Dobbin Bay.
[*From a photograph taken at Cape Hawks in* 1881.]

sional water-lanes, were visible through rifts of the fog in Dobbin Bay, and bear-tracks had been seen in the snow. The fog being dense, we remained at Cape Napoleon until about 10 A.M., when the large amount of open water, to be seen occasionally when the fog lifted, induced me to attempt an outside passage to Cape Hawks by running across the entrance of Dobbin Bay. The fog was exceedingly thick, but we finally

reached a point in the bay near Cape C. A. Schott, and about four miles directly north of Cape Hawks.

Several extensive palæocrystic floes crowded together cut us off from the south, so we were obliged to make a long detour for Cape Hawks, which we reached at 2.15 P.M., having run in from the straits to the northward of Washington Irving Island. I dropped Sergeant Rice's boat at Washington Irving Island, with orders to examine the cairn and bring in such records as he might find therein. I also directed Rice to observe carefully the condition of the ice to the southward. He reported that the cairn, in which he left a brief record setting forth our movements past and contemplated, had been untouched since our visit in 1881. "The ice to the southward," says my journal, "as far as the eye could reach from the summit of Washington Irving Island, is now in such a state that any well-provided vessel could easily run through it. I cannot but feel that we are in a critical position, not knowing what to depend upon. Since no vessel has reached this point in 1882, or 1883 to this time, we must all feel an uncertainty as to the hope for our relief being at Life-Boat Cove. If there is no party there, our situation is extremely dangerous.

"We have perhaps sixty days' provisions, except sugar; and beyond that time must depend on the resources of the country, which are of the most uncertain character. However, we shall do as we have done—our best and utmost—and by some possible chance we may succeed in reaching Cary Islands."

The condition of affairs was indeed critical, as the temperature had permanently fallen below the freezing-point (0° C.), and young ice was continually forming. Our chances of successful boating thenceforth depended on two improbable contingencies—first, that the temperature should permanently rise

so as to prevent new ice forming; and, second, that strong gales should keep the floes moving and changing.

With our boats we had worked and struggled over three hundred miles, through constant ice of such size and danger as must be seen to be appreciated; escaped safely from the hundred perilous nips, we had reached a secure harbor, from which we looked southward a scant fifty miles to the bluffs of Cape Sabine. We knew not that five weeks before the Proteus had sunk in the sea within our vision; but it needed no record to tell that dangers and hardships were before us, and privations, if not disaster, in store.

ENGLISH DEPOT AT CAPE HAWKS.

CHAPTER XXXVIII.

OUR BESETMENT.

IN the meantime we had not been idle. A foot of newly-fallen snow obliterated all familiar landmarks at Cape Hawks, but I soon found the ledge where the English depot was situated. It consisted only of stearine, three hundred and forty-two pounds; rum, about six gallons; preserved potatoes, one hundred and sixty-eight pounds; bread, about two hundred and fifty pounds; pickled onions, ten gallons.

The bread was in casks, which, broken open, contained masses of green, slimy mould, from which we selected all that was eatable. In less desperate circumstances the whole would have been rejected. The barrels and casks were broken up and taken for steaming purposes, as we had only a fifth of a ton of coal left. With this fuel Frederick thought he could steam to Littleton Island, where coal was cached.

We left Cape Hawks at 4.25 P.M., August 26th, and ran southwest parallel with the coast an hour or so, when the old ice increased in amount and much young ice was visible. This young ice much alarmed me, especially as the night bid fair to be clear and cold, which would greatly facilitate the formation of more. I concluded, after careful deliberation, to try a direct course for Bache Island, and gave orders accordingly, on consultation with Lieutenant Lockwood, who agreed with me that it was the best, indeed the only, course to follow. Sergeant Rice, who was in charge of the whaleboat, was called

forward to steer and assist in running the launch, as, in addition to being a man of excellent judgment, he was the best navigator of the party. After leaving the coast the outside ice opened somewhat, and we made considerable progress to the south and eastward, where we met such ice as beset us. If we could have gone a mile farther to a large floeberg, I believe we would have reached water navigable to Cape Sabine—an opinion shared by Sergeant Rice and the acute Eskimo Jens. We tied up to a small floe, with the small boats entered for hauling up, about seventeen miles from Victoria Head.

"August 27th.—Longitude, 75° W.; latitude 79° 22′, from bearings. Still beset, with no change; possibly we have drifted a little to the northeastward. Temperature last night went down to 18° (—7.8° C.), justifying to an alarming extent my fears about young ice, which to-day will bear a man in some places. Our condition now is a trying one, but had we run along shore to Allmann Bay, where Nares had such an experience with young ice, I feel certain we would have been in a worse condition. We saw several narwhals this evening. I had a tripod twelve feet high rigged up for a lookout. About 8 P.M. called the men together and explained our condition to them. Told them there was a fair chance of getting through, as there was a day's coal for steaming; and that, at the worst, we could reasonably expect within the next thirty days to drift into Smith Sound, where we must pass within eight or ten miles of the coast. Everybody appears to be in good spirits, and no one, I think, is disheartened."

Lieutenant Lockwood writes: "There are a great many dangers in being out in the straits this way, but probably it is better than the other alternative. The English had great difficulty in crossing Allmann Bay, having to break through young ice four inches thick. This they managed to accomplish (with their

large vessels), but of course the little launch could never get through any such ice."

The temperature the following night sank to 12.5° (−10.8° C.), but rose in the day, under the influence of the sun, to 30° (−1.1° C.). The sky was unfortunately clear, the weather distressingly calm, and the latitude at noon 79° 23′ N., showed two miles' drift to the north. We found on an adjacent floe a fine pool of fresh water, which obviated the necessity of melting ice.

A proposition was made to reduce the rations, which I considered unadvisable, fearing the effect on the spirits at the time, and on the strength later when extraordinary exertions would be necessary. Brainard's field journal says: "Connell walked on the new ice; it is now three inches thick. Adversity in any form would fail, I think, to dampen the spirits of the men. Our situation is desperate. Any moment the ice may crumble beneath our feet, and the sea swallow up the entire party, still, while exercising on the ice this evening, the men danced and sang as merrily as they would have done in their own homes. They are irrepressible in the face of all this uncertainty and perhaps starvation."

"August 29th.—Situation substantially unchanged. A minimum of 22° (−5.6° C.) was registered last night. Calm weather all day, which, continuing, will soon prove fatal to our efforts to reach Victoria Head, and must inevitably lead to the abandonment of the launch and at least one boat. Our only chance of escaping the pack seems to rest upon a storm, as the young ice grows steadily thicker. Some of the men washed in the pool of water found on the adjoining floe, but most did not. I decided to-day to allow the fire under the boiler to go out, so as to save our small stock of coal for further emergencies."

"August 30th.—Israel got a meridian altitude to-day, which

puts us in 79° 22′ N., and shows a drift south of 1.4 miles in two days, a distressingly slow rate. Day very fine and bright, but too cold for a weather-breeder. The minimum last night was 11.8° (−11.2°C.), the lowest August temperature within my memory. An inventory to-day shows that we have left: Bread, 1,100 lbs.; corned beef, 187 lbs.; roast beef, 26 lbs.; English beef, 16 lbs.; English bacon, 100 lbs.; boiled bacon, 38 lbs.; American bacon, 112 lbs.; pemmican, 150 lbs.; pemmican (Polaris), 135 lbs.; pemmican, plain, 168 lbs.; pemmican, Hudson Bay, 100 lbs.—making 1,244 lbs. of meat; extract of beef, 5 cans; extract of mutton, 29 cans (each can of extract holding about 1½ lbs. net); soup, 17 cans; butter, 33 lbs.; beans, 58 cans; cranberry sauce, 6 cans; apples, 6 cans; tea, 20 lbs.; salt, 4 lbs.; pepper, ¾ lb.; candles, 4 lbs.; preserved potatoes, 168 lbs.; coffee, 12 lbs.; tobacco, 40 lbs.; stearine, 519 lbs.; wicking, 3 lbs.; lime-juice, 10 gals.; alcohol, 40 gals.

"We have tea and coffee enough for forty days, all other provisions sufficient for fifty days, but they can be easily made to last sixty days. In the meantime there is no telling what may befall us. Connell thought he saw smoke in the direction of Cape Sabine. It is so cold at present that one can keep warm only by exercising. A fox and three gulls (burgomasters?) were seen to-day."

"August 31st.—Falling weather this morning added to the foot of snow which now covers loosely the floe; from our cross bearings it is possible we may have drifted two or three miles to the south-southeast; no observations to-day. The men are generally well, although suffering considerable discomfort from the cold. Ralston's mouth is sore, and the doctor ordered lime-juice for him. Lieutenant Kislingbury has a slight cold. Served out three-eights of a gill of rum to each man to-night, taking none myself. It appears evident that we shall be con-

fined here some time. I can not think that we shall have open water again this year, but refrain from saying so to the men. Consulted with Lieutenant Lockwood regarding our future movements. I told him that September 10th was the limit which I was willing to await for the spring tides and wind to break up the floes and release us. In case this does not occur, I propose to cache our pendulum and records on Bache Island, abandon all but the ice-boat, and with that reach shore, believing that we can carry but one boat. Lieutenant Lockwood agreed with me as to the unadvisability of waiting beyond the 10th, but thinks at least two boats should be taken."

"September 1st.—Our latitude, 79° 19′ N. by observation, (73° 45′ W.) was somewhat encouraging. At 2 P.M. the young ice cracked considerably, and shortly after the heavy floes from the north set down rapidly toward us. The boats, which had been already entered, were hauled up. The launch, caught by the thick floes, was raised entirely from the water, but stood the shock without injury. The young ice, weakened by the new snow, broke up with the shock and piled huge masses of rubble on the edges of all palæocrystic floes. The action appeared to be due to the strong tide, which was about half ebbed. The launch remained entirely out of water until 6 P.M., when the flowing tide loosened the heavy broken ice and allowed her to settle to the water-line. At the first signs of danger everything was removed from the launch, so as to avoid any possible loss of provisions or other supplies. Christiansen and Jens went north on the ice this morning and killed a small harbor-seal, which, by adding a half ration of bacon, will make two good meals. Two walruses were heard last night by the Eskimos."

"September 2d.—Later Jens killed another small harbor-seal. I gave him a half gill of rum as a reward, and have promised the same allowance in case of any game being killed by him or Chris-

tiansen. The weather is calm and foggy, with a great deal of water around between the floes east and west as far as can be seen, that is, from two hundred and fifty to three hundred yards. Of course it would be insanity to attempt to move in such a dense fog, and with the heaviest tide of the month only an hour off. It is tempting, but too dangerous. In order to avail myself of any opportunity, I had the boiler refilled with water this evening.

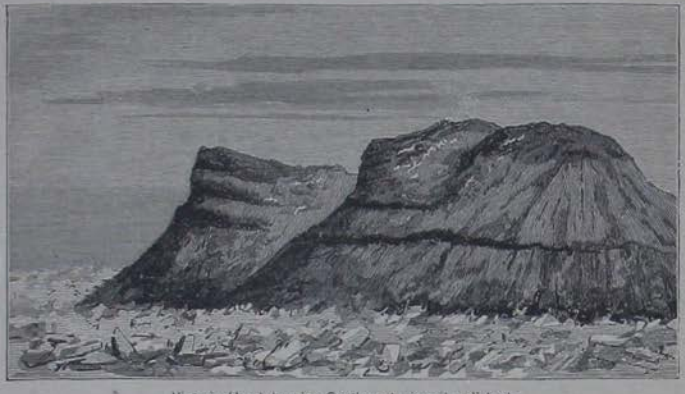
"As soon as the tide changed, just after midnight, the pack closed suddenly and violently, and within two hours the launch was lifted bodily from the water and settled down again three or four different times. This speedy change in the condition of the ice shows how dangerous the attempt to move would have been. It would have taken an hour to get up steam, and if we had started we would probably have been crushed by the ice, but in any event would have wasted our fuel. Those who last night were clamorous to go on had nothing to say this morning, when not a pool of water could be seen. When the nip occurred Lieutenant Lockwood, who is the only one at present sleeping in the launch, got up once, but turned in again, preferring the comfort of the boat, with the accompanying danger, to sleeping on the floe. During the commotion our heavy floe, jammed between immense palæocrystic floes, was so badly cracked as to render it necessary to move. At 6 P.M., at the turn of the tide, I gave orders to keep a sharp lookout, in order that we might change our quarters if the ice should loosen to such an extent that we could move the launch, which was sharply nipped. The ice remained closed around the launch during this tide, although it opened in three places. Lieutenant Kislingbury has been discussing our position freely with some of the men, particularly with reference to moving. As the launch cannot be started, such a change would mean its temporary abandonment

and possible loss with all it contains, a course not to be thought of as yet. Our floe is not a palæocrystic one, and there is none such near by. During the changes to-day the palæocrystic floe from which we have obtained water moved away."

"September 3d.—Israel got an excellent meridian observation to-day: our position is 79°15. 6′ N., 74° W. Private Whisler's term of service ending to-day, he was given his formal discharge and final statements. None of the men have been very despondent during our besetment, yet it is noticeable now that they are very much encouraged by our latitude. Just after eleven o'clock last night the ice loosened sufficiently to allow the launch to sink to her water-line. I at once put the boats into water and moved the party to a larger and stronger floe, on which we are now encamped. Our new floe is a mile long by a mile and a quarter in width, but has no water. Our boats are well hauled up, and the launch secured as safely as possible. Most of the crew belonging to the launch have returned to her, and are now sleeping in her. There has been no pressure from the ice during the last two tides, which I consider an encouraging sign, as it seems to indicate an open space of possible navigable water a little to the south of us. We have a tripod up, but can scarcely see more than five miles in the most favorable direction, and perhaps two or three in other quarters. The only water in sight from the tripod consists in a few small passages near us. The weather remains dull and distressingly calm. My ink froze solid last night. At 8.30 this morning Victoria Head bore 4° southwest; now, 1 P.M., it is nearly 16°, indicating a northerly drift during the flowing tide. Gardiner has made an excellent sketch of Bache Island, showing Victoria Head, with Cape Albert in the distance.

"This afternoon, I overheard Lieutenant Kislingbury dis-

cussing our situation again with some of the enlisted men, commenting strongly on our remaining quiet, and also because I did not move in the fog of Saturday night. I at once interfered, fearing the influence of such criticism upon the discipline of the enlisted men, whose soldierly conduct has been so far admirable. I called his attention to the fact that such criticism was unofficer-like, and could not but cause discontent, if nothing more. He disclaimed any intention of reflecting upon me.



Victoria Head, bearing Southwest, six miles distant.
[*From a sketch by Sergeant Gardiner.*]

"Later I thought best to call together the officers and two of the sergeants. In dwelling on our situation I pointed out to them the indispensable necessity of hearty and united action, and of supporting to their utmost any plan which I should adopt. I expressed a desire for the frankest possible opinion of each one as to what would be the wisest measures to pursue. I said that every one was aware that we were drifting slowly southward, and that every opportunity of moving south or southwest was improved. I expressed my opinion that a party with provisions, and probably a ship, were at Life-Boat Cove; but,

as regarding plans for the future, I did not feel that we should calculate on any provisions beyond the two hundred and forty rations known to be in Payer Harbor. Lieutenant Kislingbury, whose opinion I asked first, advised the immediate abandonment of the launch and one boat; and that, with our sledge, we attempt to move two boats and five thousand pounds of selected baggage to Victoria Head. He thought we could move everything, without difficulty, from floe to floe. He would follow Bache Island to Cape Albert, and, instead of attempting to cross Buchanan Strait, would pass around it, by which route he thought we could reach Cape Sabine in the time during which our rations would last—fifty to sixty days. Dr. Pavy's opinion was the same as Lieutenant Kislingbury's, except he would delay a day. He thought we could make four miles a day, and that Cape Sabine could be reached within a month. Lieutenant Lockwood was unwilling to recommend any change in our plans for the present, as waiting on the drift could do no harm, and he believed there was no chance of crossing the pack at present. Sergeant Brainard said that, from past experiences, he believed it impossible to reach shore with our heavy load in the present loose state of the ice; and that he thought it best to await the action of the drift until open water appeared or the young ice was strong enough to travel over. Present exertions would only exhaust us. Sergeant Rice's views were the same as Brainard's. He said that, if Lieutenant Kislingbury's plans were followed, he felt positive only one boat could be got to Cape Sabine, and that, in case of crossing Smith Sound, but half the party could go, and the future of the remainder would be uncertain. He preferred waiting the chances of the pack opening, or, later, the formation of young ice. I then said that my plans would be to uniformly and persistently follow any opening which could carry us either south or toward land, but

that I thought any immediate movement, unless lanes of water should appear, would exhaust the strength and spirits of the party in fruitless efforts. They knew, from hourly experiences, that the floes were not united, and that constant changes were occurring in the pack; and I thought it best to await the action of the current. If, by extraordinary exertions, Bache Island could be reached, our foot-gear would about be worn out, and we would still have Buchanan Strait, nearly twenty miles wide, to cross by boat.

"If our drift carried us to the southwest, we could make the nearest land (Cocked Hat Island) as soon as young ice would permit travelling; and, if carried greatly to the southeast, I would try to reach the nearest point on the Greenland coast (Cairn Point or Littleton Island), relying on the dense and cemented ice in that direction to enable us to reach land. Sergeant Brainard said the men would cheerfully agree to any reduction of rations, in which Sergeant Rice agreed, but thought the doctor's opinion would be valuable on that point. The doctor thought a reduction would not be *positively* injurious. I said I thought it best to continue full rations for the present, as we had bread, meat, potatoes, and fuel to last until November 1st, and needed strength for emergencies."

"Off Victoria Head, September 4th.—William Whisler reenlisted as a private to-day. Commenced preparations for future travel. Cross and Elison made a sledge from the launch-seats, which is to be shod with iron bands from the boiler. Jens shot a small harbor-seal to-day. Fredericks reports that our canvas cannot be well utilized in making tents, and recommends a tepee on the Indian style, so an experimental one of fifty-four feet circumference, which could accommodate eighteen men, was put up on the ice. The ice-boat Beaumont, with canvas shelter, will hold nine, so that the sick (if any)

and most weakly can easily be sheltered in her when we travel.

"The tepee is made of the sails (uncut and available as such) of the launch, whaleboat, and dingy. A very large palæocrystic berg which has kept us company seemed nearer this morning; sent Lieutenant Lockwood, Connell, and Christiansen to it. From the summit of the berg, probably a hundred feet above the water-line, several leads were seen in the northerly quadrants, and also toward Bache Island, which could not be reached.

"At 9 P.M. the ice loosened up, and it appeared possible that Cape Albert might be reached. The boats were immediately put into the water, and took the launch in tow while she was getting under steam. We were able to proceed only about a mile toward the southwest, and were then obliged, by the closing of the pack, to take refuge on a small palæocrystic floe about two hundred yards square, on which the boats were hauled up and the launch secured as safely as possible. She was raised during the night by the moving pack some distance above her water-line, but very gently and without receiving damage."

"September 5th.—Meridian observation to-day in 79° 09′ N. We have made seven miles southing in two days, a fact which gratifies everybody, and shows that the pack is in such a condition that a movement by sledge would be not only dangerous but impracticable. The day is bright, fine, and clear, with a low, threatening barometer, which continues falling. May the gale come from the north! We commenced melting ice for cooking to-day, there being no floe with a lake accessible.

"Long shot a small harbor-seal, which will serve for two meals when cooked with a half ration of bacon. Everybody eats seal now, although only a week ago there were at least three who could not abide it. A number of the men drink the blood of the seal whenever they can obtain it. The launch party, of

which I am one, has concluded to sleep in her, taking the chances of a precipitate retreat in the height of a gale to sleeping on the naked floe. It is strange how indifferent we become to dangers and perils that daily, rather hourly, beset us, and which, stirring and exciting to us at first, now seem ordinary and a matter of course. The Eskimos and Long are hunting, as usual; Jens saw a small seal and went out in his kayak, but did not get him. The temperature is down to 13.9° (−10.6° C.), and we suffer much in our inactive condition from the cold."

"September 6th.—79° 0.6′ N.; about 74° 45′ W. A heavy gale from the northeast set in last evening. At first we drifted rapidly to the south, but later moved very slowly, although wind and tide were both in our favor. From this it would appear that there is no water of extent between us and the south side of Buchanan Strait. The launch has escaped unharmed from the pressure of the pack to-day, receiving only two nips which raised her gently and slowly a foot or two above the water-line. The watch awakened us when the nips occurred, but, the ice not being of a very dangerous character, nobody troubled himself more than to glance at it and go to sleep again. This morning Cape Camperdown, which has for several days been observed by compass for Cape Albert, was 4° south of west. From this it seems we have made only two or three miles southing, although we have moved considerably to the west and are now only three miles from the land, Capes Camperdown and Albert being equidistant from us. It was an agreeable surprise to us when our noon observations gave 79° 0.6′. It is evident that the south coast of Bache Island is laid down wrong, or else the declination has changed very materially since 1875–76. I presume that the position of these capes must have been laid down from bearings or from dead reckoning. Cape Sabine and Victoria Head, I suppose,

must be accurately located. Victoria Head has agreed with our previous observations, but Cape Albert has been out all the time. It is very encouraging to know that we are only seventeen or eighteen miles from Cape Sabine, and twelve or thirteen from Cocked Hat Island. I doubt not we can reach Cape Sabine without any extraordinary efforts; one opening by boats, and then the sledge must do what is lacking. It is bright, sunshiny, and pleasant; minimum temperature, 19.5° (−6.9° C.); and the men are improving it by drying everything, and by putting our foot and other gear into the best possible condition. I pray for a gale, as a clear, calm night with the sun now below the horizon, would be fatal to any farther advance by boats, as the tides are unfortunately neap the next two days."

"September 7th.—In reducing our magnetic bearings, it has previously been assumed that the variation of 110° given on the English map was correct, but, as the reductions of our observations do not agree with the map, I directed Sergeant Israel to make special observations for declination. From such observations, at 5 P.M. to-day, the variation was determined to be 105° 9′ W., which makes our bearings more, although not entirely, in accord with the chart. Cape Camperdown is now due west, and so now must be in this latitude, 79° 0.6′, which is some two miles farther south than is shown by the map. The trend of the south coast of Bache Island is apparently correct, as we cannot see the Weyprecht Islands."

"September 8th.—79° 0.6′ N.; about 74° 45′ W. The temperature last night was fatal, I fear, to farther advance by boat, as it sank to −0.8° (−18.2° C.), the lowest I have known this early in the season. The young ice over large pools will not yet bear a man, but will do so wherever there is the slightest mush or rubble ice. The barometer is yet rising, but the little

wind we have hangs in the north. In consequence I have decided to sledge, and have accordingly given orders to hurry up the sledge repairs and building. Last night a walrus showed itself in the open pool near the floe. Connell first saw him and gave him five shots, Lieutenant Kislingbury two, and Christiansen two, but apparently it had no effect upon him. Several others were heard during the night. An excellent observation at noon showed that our position was unchanged; and, indeed, it was evident to us all from the lay of the land and the bearings. Lieutenant Lockwood, Sergeant Rice, Christiansen, and I visited a large palæocrystic floeberg some four hundred yards east. The berg was about a half mile long by a quarter of a mile wide, and had an extreme elevation of, say eighty feet, and an average one of sixty. Running entirely across the south end of the floe were two ravines, separated by a hill ranging from twenty-five to fifty feet in height, in which lay rocks of very considerable size, say from one hundred to five hundred pounds, which were scattered from one end of the ravine to the other and generally covered by new snow.

"These rocks are evidently the remains of a medial moraine, and prove conclusively the correctness of my previous observations and deductions—that palæocrystic floebergs are parts of an enormous glacial ice-cap. [Lieutenant Lockwood's journal shows that he had discovered such rocks on a floeberg September 4th. There is doubt as to its having been in the same berg.] The only open water visible was a lane two to four hundred yards wide, which ran south from Camperdown perhaps a third of a mile; in all other directions nothing was seen besides densely packed ice. The floes visible were large, in general of last year's ice; occasionally, however, a palæocrystic one was visible. The Eskimos both say that the ice in Buchanan Strait is of last year, and that it has not broken up this summer. The un-

broken ice, as they call it, was four to six miles distant. I looked for the best route, which seems to coincide with the direction of the nearest land, Cocked Hat Island, toward which our efforts will turn Monday, unless important ice changes occur in the meantime. Rum issued in the evening.

"September 9th.—Lowest temperature last night, 8.5° (—13.-1° C.), with a fresh northerly wind, which had no effect upon us. Our position remains unchanged, and the young ice grows thicker. Steam was got up to blow the boiler out and leave it in such a condition that it can be readily used. The launch was pulled up as far as possible on the floe, and secured by anchor and chains. This morning I called together the officers and Sergeants Rice and Brainard. I notified them that, unless some great change took place, I should start by sledge to-morrow for Cocked Hat Island, and that two boats and all provisions would be taken. The second boat was to be taken in deference to the opinion of the officers, who thought a movement with one boat dangerous, although I felt confident a day's experience would show the impracticability of hauling two. I was doubtful as to the advisability of taking along three hundred pounds of stearine, the shot-guns, and their ammunition, but decided to do so, although the latter could be of no use this autumn.

"I informed them that, excluding sledges, we had sixty-five hundred to seven thousand pounds to haul, so it was evident that we must travel three times over the same ground. As soon as we were at such distance from land as to make separation any way secure, I contemplated sending an officer and two men for such reports and information as might be found at Brevoort Island. If we learned that boats were there, as they should be, we could drop our own and make good time, but at present I hardly looked for more than two miles advance a day. At Cocked Hat Island I intended leaving everything, except

sleeping-bags, cooking-gear, and a few days' rations, and move thence rapidly to Cape Sabine.

"I then asked the opinion of each one as to the advisability of further delay, as to any modifications of my plan, as to what could be abandoned, and for any other practical recommendations. Lieutenant Kislingbury advised no further delay, and had no recommendation, except that boats and everything should be on the same floe at all times; an impracticable plan, owing to the many small floes, where each transfer would entail a loss of hours in changing loads. Lieutenant Lockwood recommended no change, but thought everything should be taken and abandoned later. Dr. Pavy concurred in the views previously expressed, but recommended the abandonment of one keg of lime-juice, which was done. Sergeants Rice and Brainard had a few practical recommendations as to loading, etc. Brainard suggested that a man be detailed to select the route of travel, which I approved. I prepared records, which were left in the launch and Valorous, wherein were set forth our condition and my intention of reaching Littleton Island and possibly Cary Islands.

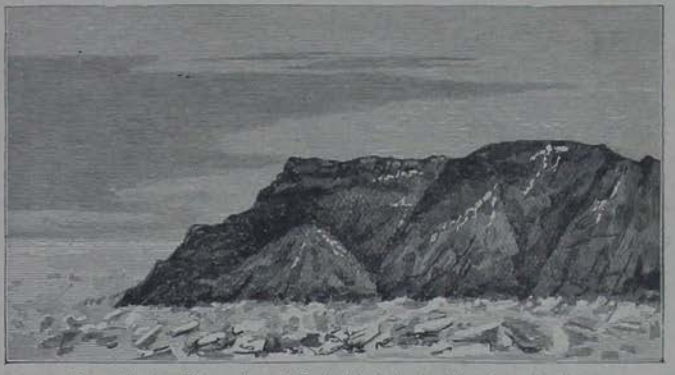
"On this day in 1876 Nares was fortunate enough to escape the pack in a latitude twelve miles north of this point, but it is very certain that he could not have done so this year, even from a few miles south."

At this time occurred to me the idea of attempting to reach Cape Sabine over the moving pack in order to communicate with the relieving steamer, whose presence we expected, which was soon to leave Smith Sound, September 15th being the date mentioned. Such an attempt, while involving possible death for those venturing, might also save the party from great future suffering and perhaps death.

I accordingly broached the subject, mentioning also Sergeant

Brainard, who had volunteered to accompany me. The officers objected to my personally venturing; and, although other volunteers were not wanting, the plan was dropped, as I was unwilling others should incur such obvious and extreme danger. I acknowledged the views of my officers to be wise and right, and afterward I confined myself to the position of being the last man of the party until land was reached.

We had been beset fifteen days, and had drifted twenty-two miles to the southward; but now the winter floes seemed fixed,



Capes Albert and Camperdown of Bache Island, bearing West, four miles distant.
[*From a sketch by Sergeant Gardiner.*]

and for three days we had not moved, while the young ice, steadily forming, was from four to six inches in thickness.

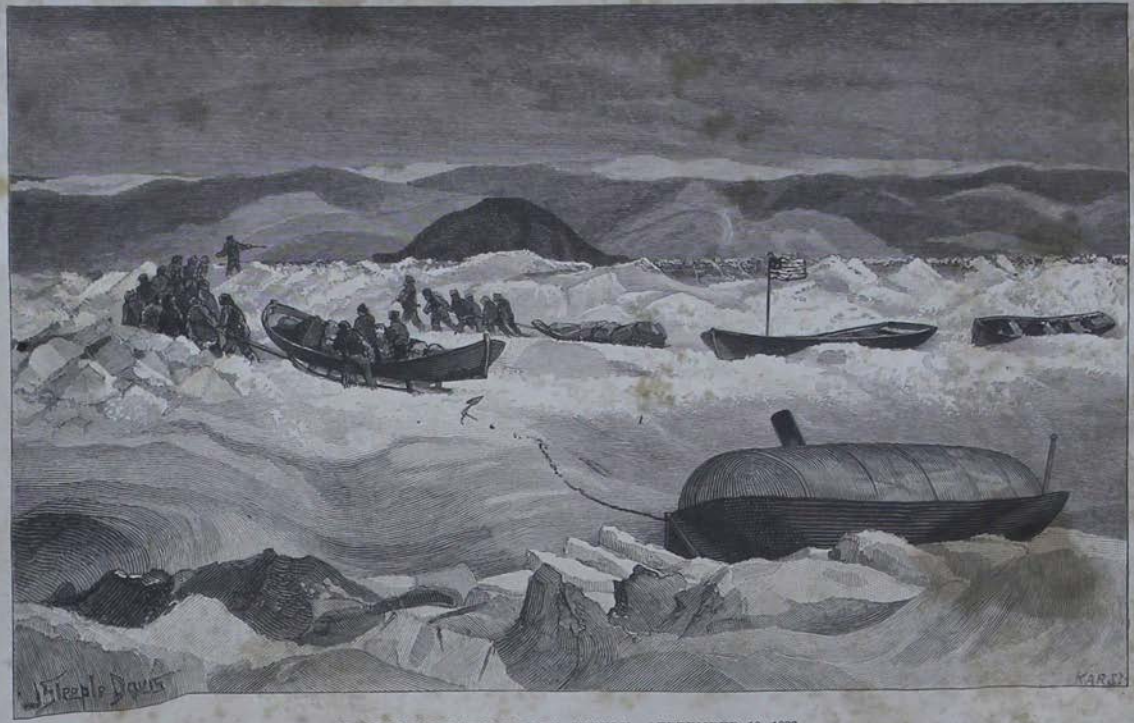
To the westward, a few miles only, were Capes Albert and Camperdown of Bache Island, while, in the direction of promised and expected help, Cocked Hat Island was only eleven miles distant. Evidently the time for exchanging the boats for the sledge, and for abandoning the policy of patient waiting for that of energetic action, had come.

During our long days of inactive and weary waiting the conduct of the enlisted men had been worthy of the highest

praise. The steadily increasing cold, the monotony and confinement to a narrow compass of ice, the many discomforts of their surroundings, and the grave uncertainty as to their future fate (which evidently must entail even greater hardships), had no power to dishearten or discourage them, and even failed to quench their exuberant spirits.

Sergeant Brainard, in that desperate strait, truly wrote: "The conduct of the men since we have been in this unfortunate situation has been beyond all praise. They are to be highly commended for their unselfishness, and for their happy faculty of making the best of everything, even under the most trying circumstances. When first imprisoned in this uncertain pack, I thought there would be endless repinings and lamentations; but, to my surprise, good-natured chaff, a hearty, ringing laugh, or a snatch of song can be heard from the irrepressible little band almost any time. Most bodies of men placed in these circumstances would have become discouraged, and have lost their spirits, and even all interest in efforts to save their lives."

And so, that last Sunday evening on the frozen sea, we offered words of praise to the Almighty, and, with renewed faith in the Divine Providence, with no repinings over past sufferings, but with the determination to do our best and utmost on the morrow, we sought what rest we could in our comfortless bags.



ABANDONING LAUNCH LADY GREELY—SEPTEMBER 10, 1883.

CHAPTER XXXIX.

STRIVING FOR THE SHORE.

"SEPTEMBER 10th.—Fresh northeast wind, with light snow, kept us quiet in the morning, but, the weather clearing somewhat, we started at 1.45 P.M. The twelve-man sledge, with the ice-boat Valorous and six hundred pounds other weights, was dragged by myself and thirteen others; Lieutenant Kislingbury, with five men, dragged seven hundred pounds on the six-man sledge; and Sergeant Jewell, with three men, some four hundred pounds on the four-man sledge. The four-man sledge broke down so completely shortly after starting that it had to be abandoned. The six-man sledge, breaking down near camp, was taken back to the launch for repairs, and later hauled a load. With the twelve-man sledge I then returned for the whaleboat and six hundred pounds. Later the same sledge returned for the loads left by the broken-down sledges, and the last party got into camp at 7.15 P.M.

"To make a mile and a quarter good toward Cocked Hat Island, we have travelled nearly twice that distance to-day, thus making at least ten miles' march for all, and fifteen for some. After the first load had been hauled heavy snow set in, which made travelling very uncomfortable. Only nineteen men, including the officers, except myself, returned for the third load. The twelve-man sledge certainly does astonishing work, for now I realize the force of Nares' statements that a boat enormously

increases the difficulty of travel.* The weight at the ends, acting as levers with a powerful fulcrum, causes us to work at a great disadvantage on a rough road, which is about half the time. The snow, about a foot deep, also impedes our progress, and the opinion is general, that it requires about as much expenditure of energy to travel through such snow with a light sledge as with a loaded one.

Jens, our Water-Seeker.

"The officers have followed my example, and have taken to the drag-ropes without being requested to do so. Every one pulled with great energy, and the heavy work, coming after long inaction, has taxed every one's strength to the utmost. For myself, I am thoroughly worn out physically, not to mention mental anxiety as to both present and future."

"September 11th.—Camped on a palæocrystic floe last night where there was a water-pool, over which the young ice was

* Nares says: "When a navigable boat is added to a sledge, the difficulty of the journey increases enormously. Dr. Rae, although an experienced Arctic traveller, in 1849, could not move his boat a single day's journey over the ice until water made."

about six inches thick, and we are equally fortunate to-night, thus saving time and fuel for cooking. Jens has constituted himself our water-seeker, and as soon as camp is made he sallies forth with his ice-staff in hand; and, tapping around in the deep, soft snow, soon finds a frozen cake on the palæocrystic floe.

"Light snow, with very thick weather, this morning, so I directed the men to remain in their bags until it cleared somewhat. At 8 A.M., Cocked Hat Island being visible, orders were given to start, and at 8.40 the Valorous moved out, followed by the six-man sledge. We are camping as follows: Lieutenant Lockwood, Dr. Pavy, and myself, with nine men, sleeping on the ice, covered by the tepee; Lieutenant Kislingbury and six others in the whaleboat; Sergeant Brainard, with six others, in the Valorous. Amongst those sleeping in the boats are the weakest, who are much more comfortable there than on the floe. Saw a large raven this morning. Sergeant Brainard has been very energetic to-day, as yesterday, in selecting our route. Although heavy snow set in to-day just after starting, we were able to make nearly a mile good. We are now camping on a very large palæocrystic floe, which extends to the southwest some two miles to an immense floeberg. An inch of snow fell in three hours this morning. All made two trips, and then fifteen men, including Lieutenant Lockwood and Dr. Pavy, went back for the last load, which, being heavier than was calculated, took them longer than the other trips. Lieutenant Lockwood insisted on returning in my place, believing that I should show myself some consideration physically on account of mental anxiety and responsibility. On the arrival of the last load supper of hot tea and stew was ready for the crew, and we had also erected the tepee, fixed up the boats, sleeping-bags, etc. Dr. Pavy and Sergeant Brainard went later to a large floeberg some

two miles ahead of us, and brought back very discouraging reports. Toward Cocked Hat Island new ice extends from two to four hundred yards, and then only rubble from young ice as far as they could see, while the only floes seen were to the eastward. To the west the rubble was more dense than to the south, and it was several miles to the heavy fast ice. From Cape Camperdown stretched for a mile south a lane of very young ice. They thought that the floeberg was grounded, and had prevented this pack from moving south. The pressure on the floeberg must have been tremendous during the late storm, as rubble from the palæocrystic floes had been forced up to the height of fifty or sixty feet. I called together the officers and Sergeants Brainard and Rice; and, after Dr. Pavy and Sergeant Brainard had reported the condition of affairs, informed them that the spring tides would come in about four days, and asked their opinion as to our future movements. Lieutenant Kislingbury, Dr. Pavy, and Sergeant Brainard advised moving up to the berg to await the heavy tides. Lieutenant Lockwood advised going to the east of the floeberg and camping there, sending out men to examine practical routes. Sergeant Rice thought it possible we might in some way reach the ice to the westward. I said that we had only forty days' rations, and that time just now was more important than rations, as darkness was fast approaching. I was unwilling to exhaust the strength of the men by moving our enormous load in any direction, until it was certain we should move in that quarter; and, as Dr. Pavy and Sergeant Brainard concurred in thinking that the two miles to the floeberg could not be made in less than two days, owing to the heavy snow, I would start in that direction, but at the same time send out parties to examine other routes. Dr. Pavy and Sergeant Brainard saw several walruses in the young ice, and thought that they heard a dog bark. It caused a faint

hope to rise up in our hearts, but after several shots were fired we concluded they must have been mistaken."

"September 12th.—78° 50.9′ N. I decided this morning to select the route before starting, and so sent Dr. Pavy to the southeast and Lieutenant Kislingbury to the southwest. The men in the meantime improved the sun by drying sleeping-bags and clothing. Last night the ice melted under us in the tepee, wetting the sleeping-bags through. The men yesterday did not eat their entire ration, and half a ration was issued to-day, the entire party being content. Both scouting parties returned at 1.25 P.M. Lieutenant Kislingbury brought back the most discouraging reports of the ice to the southwest. Dr. Pavy and Sergeant Rice reported a practicable but difficult route to the southeast, and we moved at once. As we were about to start, the three officers and two sergeants came to me and strongly and unanimously recommended the abandonment of the whaleboat, fearing it might break down our sledge and compromise our ultimate safety. I at once concurred, being satisfied of the necessity, as I believed from the first that only one boat could be taken. I have only hauled the second out of deference to the opinion of all of my officers and most of the men, and it took two days instead of one to convert them. We put a flag on the mast in the whaleboat, and left a record. Bear-tracks were seen to-day, and many walrus-holes in the young ice. We got off at 2.10 P.M., and found a chain of small lakes on a large palæocrystic floe, which afforded excellent travelling and enabled us to reach the end of the floe at 3.30 P.M., making a distance the doctor and Sergeant Rice had reported upon their return it would require two days to pass over. Our progress shows the decided advantage of detailing Brainard to select the route. Beyond was a belt of new ice, interspersed with occasional heavy rubble and narrow channels of open water, which de-

cided me to camp. The second load hauled quite heavily, but we made it in an hour and a quarter; everybody in the drag-ropes, except several whom I detailed to cook, etc. We have made good about two miles in a direction nearly south. Owing to the very bad ice just in front of us, we shall have to make three and possibly four loads to-morrow. We have used our last sugar. Rum is now issued after each day's march."

"September 13th.—Established a guard during the night, as bear-tracks a day old were seen yesterday. The abandonment of the whaleboat has deprived Sergeant Rice and his party of its shelter, and in consequence they have commenced sleeping on our two sledges. The sun was shining this morning, for the first time since leaving the launch; and, indeed, for some time before. The temperature was 6° (—14.4° C.) during the night, and only 10° (—12.2° C.) at 3 A.M. We started at 7.30 A.M. The road over the rubble ice to the next floe had been smoothed down with axes last evening by a party, but was yet exceedingly bad, even dangerous in places, and was only practicable for light loads, of which there were three. In moving forward Private Bender and Dr. Pavy broke through the young ice, but neither were wet much. The large sledge broke through twice, fortunately damaging nothing, owing to Rice's prompt action and the men's responding to his warning. The first trip lasted until 9.30 A.M., the second until 12.30 P.M.; and the last load reached our new camp at 3.15 P.M. With breaking and making camp we are occupied from twelve to thirteen hours, as much of this exhausting labor as the men can stand regularly. Lieutenant Kislingbury, with his party, made two trips with the six-man sledge. Sergeant Israel, left in camp during the second trip, got a meridian observation giving 78° 56.9′ N. Several walruses were seen breaking through the young ice at various times, and Brainard saw fresh

bear-tracks again. There are wide differences as to our distance from Cocked Hat Island, it being variously estimated from four to ten miles. In my own opinion it is eight."

"September 14th.—I called the cooks at 5 A.M. The temperature rose from 13° (−10.6° C.) last evening to 19° (−7.2° C.) at 6 A.M. We moved everything in two trips to-day, but, owing to an accident to Lieutenant Kislingbury's sledge, did not get everything into camp until 5 P.M. The party were exceedingly tired, the work being of the hardest possible kind.

"The absence of sufficient light to cast a shadow has had very unfortunate results, as several of the men in the past few days have been sadly bruised or strained. When no shadows form, and the light is feeble and blended, there is the same uncertainty about one's walk as if the deepest darkness prevailed. The most careful observation fails to advise you as to whether the next step is to be on a level, up an incline, or over a precipice. These conditions are perhaps the most trying to Sergeant Brainard, who, being in advance selecting our road, finds it necessary to travel as rapidly as possible. A few bad falls quite demoralizes a man, and makes him more than ever doubtful of his senses. Travelling slowly, with our heavily laden sledges, we rarely suffer much from this trouble, as our steps are slow and uncertain at the best, but when a jar does come on a man pulling his best, it gives his system a great shock and strain.

"Brainard saw a walrus to-day, and Gardiner a fox last night. Sergeant Israel remained in camp during the second trip, but did not get an observation until about 1 P.M., from which the latitude may be anywhere from 78° 54′ N. to 78° 56′ N. At half past three this afternoon, to our dismay, we found that there was a marked movement of the pack toward the northeast, driven off shore by a high southwest wind, which soon

turned to a violent gale and drove us farther north in three hours than we had travelled southward in as many days.

"Our evening was naturally a most gloomy and despondent one, but its other troubles and anxieties were augmented for me by the behavior of Dr. Pavy, who not only misrepresented my orders to Brainard regarding the day's route as calculated to destroy the party, but endeavored to stir up feeling by falsely representing that he had advocated my remaining at Fort Conger. Such advice, which would have entailed a direct disobedience of orders, was never tendered, and would never have been considered, except physical conditions had rendered the retreat impossible. Although this insubordinate and mutinous conduct would have justified extreme measures, yet I rightly decided that I could rely on the loyalty and discipline of the party, and, by refraining, retain the medical services which would be so essential in case we failed to reach a relief station."

"September 15th.—Sergeant Israel's observation to-day gave 79° 1.8° N., a most discouraging latitude, as it is a mile north of the point where the steam launch was abandoned. The southwest gale continues with diminished force, and the temperature rose to 26° (−3.3° C.). Our drift has been steadily to the northeast, and we are twelve to fifteen miles east of Cape Albert.

"Later.—From bearings this evening, Sergeant Israel places us seventeen miles northeast of Cocked Hat Island on the Littleton Island meridian. The temperature rose to nearly 30° (−1.2° C.), and the sleeping-bags in the tepee where I am quartered are nearly all saturated from the melting ice. Dr. Pavy moved his sleeping-bag from the tepee to-night to the sledge, where he has more comfortable quarters."

"September 16th.—A fine clear day, with high temperature,

the thermometer registering 20° (−6.7° C.) at 1 P.M. Our latitude at noon was 79° 0.7′ on the Littleton Island meridian, a gain of over a mile due south since yesterday. I called the officers and two sergeants together this morning. Dr. Pavy recommended starting at once to the southwest, but the rest of the party concurred in thinking with me that it was best to remain quiet on a three-quarter ration until the direction of the drift was determined and the routes in different directions had been examined. I sent out Lieutenant Lockwood toward the southeast, and Sergeant Rice and Christiansen to the southwest, to examine the ice. Lieutenant Lockwood returned reporting good travelling and solid floes for a couple of miles to the southeast toward Greenland. About a mile east of us was a lane of water which extended a short distance to the south. The movements of the ice during and since the storm are very complicated. We are now on a very large palæocrystic floe of unknown extent, which, from 5 P.M. yesterday until noon to-day, has been slowly revolving, and in that time has changed its position through 180° azimuth. At present we appear to be drifting to the southwest. In my own opinion, which differs from the others, except Lieutenant Lockwood, who is uncertain, we should next start for the Greenland coast; and, if any chance presents itself, I shall promptly avail myself of it, as once there we are safe. At Cape Sabine our troubles only commence, as few if any of the party believe that we could now cross the straits by boats or sledge. At present we are thirty miles from Cairn Point (Greenland) and nineteen from Cape Sabine, but, while the distance is greater to Greenland, the end in view is now certain of accomplishment if we once land.

"Rice and Christiansen reported any move impracticable to the south or southwest, and we now wait until the ice settles

down. The rotary motion of the floe yet continues, and a movement in any direction might put us, at the end of a hard day's work, so much farther north instead of south.

"We now have nine hundred and ninety pounds of meat, seven hundred pounds of bread, one hundred and fifty pounds of potatoes, twelve pounds of tea, and four hundred pounds of stearine, a proportionate amount of alcohol, and some small stores; in short, forty days' rations, in which time a great deal can be done. About 9 P.M. Jens and Christiansen each shot a small harbor-seal in a water-pool nearly a mile distant, each seal weighing about one hundred and fifty pounds. Both men received the ration of rum with great satisfaction, and Lieutenant Lockwood reports that Christiansen went to his boat whistling on an empty cartridge-shell."

"September 17th.—Weather distressingly cold for our inactive condition; minimum last night, 2.5° (−16.4° C.); 7 A.M., 5° (−15° C.), calm and clear. Christiansen killed a small seal this morning. To-day is Private Whisler's birthday, and in honor of his birthday and Jewell's, which comes upon the 20th, had coffee for breakfast and our last cranberries at a lunch at noon. It may seem a trivial thing to celebrate under such circumstances, but I fancy that the effect on the men's spirits is a good one. Sergeant Israel got excellent observations at noon, giving 78° 56′ N., a drift in a day of three miles to the west and about four miles to the south. This direction of the drift changes my intention of attempting to reach the Greenland coast, which I should now follow out, had the drift been south or south-southeast as yesterday, and we travel to-day toward Ellesmere Land. Our floe continues to revolve in a direction against the hands of a watch laid on its back, and has now turned through 200° of azimuth. Our delay has been improved by repairing the broken six-man and twelve-man sledges; the

latter shows the effect of hauling the whaleboat even two days. We started at 1 P.M., and, by nine hours' hard work on the road, have succeeded in making about two and a quarter miles in a southwest direction. It is to be remarked that we came into our old camp from the northeast and started out to the southwest, but yet, owing to the rotary movement of the floe, we marched out on the same road over the same ice by which we marched in. The travelling to-day was excellent for the most part, but on the last floe was very heavy from the deep new snow. On reaching the floe I should have camped upon it, but it was separated from the one to the southwest by high, dense rubble, with a slight fringe of new ice; and, although the men were very tired, we cut rubble and hauled the boat to the new floe, in order that there should be no uncertainty about to-morrow's travel. We went to our bags after 10 P.M., worn out with the labors of the day. Land looks very near—some say three or four miles, but it must be nearer twice that distance. In order not to discourage the men, who fortunately look on the bright side, I have directed the astronomer to report our exact location to me alone, and I make it known only at suitable seasons when it confirms the hopeful view. Several bear-tracks seen to-day.

"I abandoned to-day, everything which could be spared and was not of vital importance, about a hundred pounds weight, and yet we are hauling about six thousand pounds, which necessitates only two trips however. We keep a telescope and marine glass, all rifles, a shot-gun, all ammunition, records, instruments, food, fuel, and serviceable clothing. Its outer case has been stripped off, reducing its weight, but we still carry the pendulum. I informed the men that I was unwilling, much as I wanted to save that instrument, to lessen their chances of life by hauling it longer, unless all concurred, and that it would be

dropped whenever they wished. Not only was there no objection to keeping it, but several of the party were outspoken in considering it unmanly to abandon it. Such a spirit is certainly most creditable."

Brainard's journal says: "Turned in at 11 P.M., after ten hours of the severest physical strain. As the sleeping-bags (of those of us in the tepee) are protected from the ice by only one thickness of canvas, our comfort can be imagined."

"September 18th.—Called the cooks at 5 A.M.; got off at 7.45 A.M., and camped at 9 P.M., with a short delay to drink tea, which was cooked as we worked. The labor was of the most arduous character, for we worked with a sense that the situation was desperate, as the ice was moving eastward and threatened to pass Cape Sabine. We crossed five lanes of water by boat where three loads were necessary, which involved constant change from sledge to boat and consequent separation of the party. As the pack was moving, such separations were dangerous, but were absolutely essential to progress. One or two of the men at one time commented on their being left till the last party, and in consequence I reproved them, pointing out that they were last only in their turn, and not always so. I have invariably been the last man to enter the boat under such circumstances. Rice to-day broke through the young ice, completely wetting himself. I was with him, and stripped myself of underclothing for him, which was supplemented by other dry clothing as the party came up. When we drank our tea, at 7 P.M., we were on the northern edge of a palæocrystic floe; but, though the men were thoroughly tired out, we all realized the importance of reaching land, and so pushed on for two hours and camped on the southwest edge of the floe, then being, I estimated, about four miles from shore. Darkness set in at that time (9 P.M.), which, with the open water and moving floes ahead,

necessitated our stopping. Almost every one, but Lieutenant Lockwood, Sergeants Brainard and Rice, and myself, has been deceiving himself very much as to the distance to the land, which, indeed, appeared exceedingly near. Sergeant Israel got 78° 50.3′ N. at noon to-day, with Cocked Hat Island yet to the south, showing that we must have been at least six miles from Sabine, being yet east of that cape, and certainly four and a half miles from the nearest land. As we travelled the ice drifted east, so that Cape Isabella showed between Brevoort Island and Cape Sabine. The men were so exhausted when we camped that no preparation of tepee or sails was made, and the greater part of us slept on the bare ice. As I realize the great importance of protection while sleeping, this speaks for our condition."

"September 19th.—A wretched, wretched day. Shortly after midnight the wind strengthened to a southwest gale, which was so violent at 7 A.M. that I directed pemmican and water to be served to the men in their bags, instead of their regular breakfast; and followed the same arrangement for supper. The wind was so violent that Sergeant Israel was unable to get latitude observations at noon, but we realized only too clearly that a second time we had been blown into the middle of Kane Sea. At 6 P.M. Cape Isabella and the western shore showed up very plainly, indicating that we have drifted four miles east since morning. The cape and land opened up rapidly and suddenly with the falling tide, which carries us south. At 5 P.M., from bearings, we were in 78° 52′ or 53′ N., from twelve to fourteen miles east of Sabine, seven miles west of Cairn Point, and about on the meridian of Cape Alexandra. I then invited the officers and two of the sergeants to give their views in regard to future movements. In answer to my request, they all expressed the opinion that there was a chance of reaching the

west coast if we drifted by Cape Sabine, which I thought to be very doubtful. I expressed my opinion that the proper course was to abandon everything but two thousand pounds selected baggage, including records; and, with twenty days' complete rations, start across the moving pack for the Greenland shore, about twenty-three miles distant. In such case the party could haul everything in one load, and transfer by boat in two loads, which would insure our making twice as great a distance in a day as with our present loads. I pointed out that the Greenland coast was the only one where positive relief could be expected, that Cape Sabine, at four miles distant, showed that no party was there and presented nothing certain. I considered it almost impossible to travel twelve miles west while the current was carrying us nine miles to the south, as in three days we had travelled only four miles west and had drifted twelve miles to the south, thus making two-thirds of a mile westing to each mile southing. On the other hand, we had to travel only seven miles east to reach Cairn Point in twenty-two miles southing, two miles to catch Littleton Island in thirty-one miles southing, and had half a mile easting to spare to make Cape Alexandra in thirty-five miles. All recommended not moving until the floe and drift had set down—to await a favorable opportunity. Dr. Pavy was unwilling to abandon anything, unless twenty days' rations and sleeping accommodations for nine men could be carried in the boat—an impossibility. Sergeants Brainard and Rice thought great chances could be taken toward Greenland. Lieutenant Lockwood was unwilling to give a decision but favored delay. I said I considered all delays dangerous, but in deference to their opinion would not move till to-morrow, depending on our noon observations to determine the direction of our drift in the meantime; but, unless our surroundings, such as new ice, etc., prevent moving, I shall start in the direction

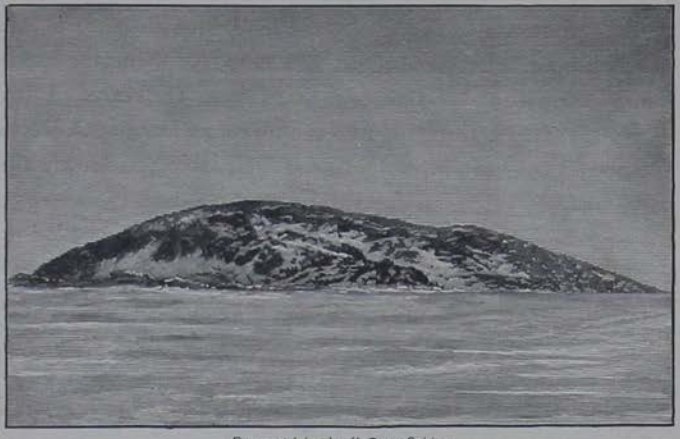
seeming best, which will probably be Greenland. I called attention to the continued criticism on our movements, which, as far as I personally knew, no person had ever attempted to repress. This remark did not apply to Lieutenant Lockwood, Sergeant Brainard, or any of those who had been sleeping in the tepee; but to the other detachment. Dr. Pavy, in his remarks, made a hostile criticism about my not endeavoring to reach Brevoort Island, as he and Lieutenant Kislingbury recommended the other night, and I at once stopped him, when he apologized and withdrew it. Had I listened to his recommendations at that time, he and Lieutenant Kislingbury, with a few others, who would have gone in the first boat-load, would have reached Brevoort Island, while the rest of us would have been left on the floe, as the gale was already setting us off shore at that time."

Our condition during the morning is thus recorded by Brainard: "This morning our sleeping-bags were filled with drifting snow, and saturated with spray from the huge waves that came dashing against the southern edge of the floe on which we took refuge yesterday. As nothing could be done we passed the day in our bags, listening to the roar of the waves and howling winds and reflecting on our helpless condition."

"September 20th.—Sergeant Jewell's birthday, in honor of which we had coffee for breakfast. A very little sugar was given Jewell and Whisler from a small quantity reserved for emergencies.

"In the afternoon Christiansen killed a large bladder-nose seal (*Cystophora cristata*), eight feet four and one-half inches in length, and weighing probably six hundred and fifty pounds. The Eskimos were considerably excited over this seal, and were very much elated at killing it, as, from their remarks, it is a rare seal along the Greenland coast. A dense fog, with occa-

sional snow, prevented our moving to-day, and made it impossible even to determine our position. I should certainly have moved had it been possible to see land in any quarter. There has been much water around the floe to-day, and the pack has evidently loosened up very much, but the temperature was down to 11° (—11.7° C.) last night, and young ice formed around the edge of our floe. During a break in the fog a bit of land showed up for a few minutes, which was thought to be Bre-



Brevoort Island, off Cape Sabine.
[*June*, 1884.]

voort Island, and bore 12° south of west. Snow, fog, cold, and hunger, added to our mental anxieties, render us exceedingly wretched; but, strange to say, our spirits are good."

Brainard writes: "We are now carrying burdens which would crush ordinary men, but the texture of the party is of the right sort, and adversity will have very little effect on our spirits."

"September 21st.—Jens shot four small harbor-seals to-day, three of which were secured. We are cooking with stearine,

and Private Bender, in the tepee, being affected by the smoke, I transferred him last night into the Beaumont, in place of Connell, who objected to exchanging a dry, comfortable boat for the ice. This evening, Connell being attacked with diarrhœa, I returned him to the boat, and brought Corporal Salor to the tepee. Snow fell the entire day, wetting all the bags in the tepee through, except possibly Doctor Pavy's and Lieutenant Lockwood's. I am exceedingly uncomfortable, but Cross and the Eskimos are even more so. Rice's party, which, since the abandonment of the whaleboat, have been sleeping on the sledge, passed a wretched night, and have to-day put up an ice-hut, which will at least protect them from the snow. I suggested that they could come into the tepee, which they declined, as it would not have much improved their condition, and would have made us yet more uncomfortable by crowding us. They are covering their house with a sail, which will insure more comfort. Lieutenant Kislingbury and the men in the boat are dry and very comfortable. The temperature was up to 26.5° (−3.1° C.) to-day. Sergeant Cross' foot, which was slightly frost-bitten a few days since, is worse to-day. The doctor dressed it, but complains that Cross does not take even the most ordinary precautions regarding it. Seal-blood is much in demand, and seal-blubber partly tried out is found palatable. Schneider has been making himself useful in making canvas boots, which supplement our insufficent foot-gear. I have only one pair of boots (seal-skin), and long since gave away my moccasins."

"September 22d.—Sergeant Israel's bearings made our position this morning directly north of Cairn Point, and in latitude 78° 54′; and at the meridian observation, which was somewhat uncertain on account of the lowness of the sun at noon, we were in 78° 52.6′ N. Our abandoned whaleboat was seen on a

floe this morning two miles to the southwest, a fact which caused great excitement. Sergeant Rice, with eight men, tried to reach her, but failed to get nearer than two hundred yards. The floe on which they landed and the one on which the whaleboat was situated were separated by pack slush-ice impracticable either by boat or foot. By experiment to-day it was determined that our boat could hold the entire party of twenty-five, and still have a capacity for eight hundred pounds of baggage, in calm weather and smooth water. The Beaumont, which was injured several days since when hauling it through rough ice, was repaired to-day. Jens shot a large seal, but it sank immediately. Four of the men having a touch of the diarrhœa—from seal-blubber the doctor thinks—I changed their diet, giving them corned-beef instead of seal-meat. The temperature fell this afternoon to 8° (—13.3° C.), but cloudy weather and light snow forbid my hoping for zero (—17.8° C.) to-night. Nearly all our sleeping-bags being wet through, we changed the site of the tepee this morning, and made a partly successful effort to dry our clothing. We are decidedly the most uncomfortably situated of the party, as Rice's crew in the snow-house are quite comfortable, and Lieutenant Kislingbury's in the Beaumont especially so."

"September 23d.—During the night we had snow, with a heavy gale, probably easterly, which drove us very near the Ellesmere Land coast again. Yesterday we were twenty-one miles distant from Cairn Point and fifteen from Sabine, but to-day we are about nine miles from land, equidistant from Sabine and Cocked Hat Island. It has been a disagreeable, stormy day with a cold northeast wind, and the temperature has fallen to 8° (—13.3° C.), so that we have suffered much from our forced inaction. The men who were ill yesterday are better to-day; we are all very wretched, however, and, to add to my

trouble, I cut my hand badly on a piece of ice. Our issue of rum, which is discontinued on idle days, alleviated the men's sorrows somewhat, and proved a great benefit to all."

"September 24th.—Wind, at 4.30 A.M., southwest, but changed to north, and then to the northeast. The temperature during the night fell to 4° (15.6° C.). I called the cooks at 6.30, but breakfast was not ready for two hours. A small lane of water showing up, I sent Sergeant Rice to see if it was practicable for the boat. He reported that we could only reach the floe visited Saturday, that we could travel over it, but it would be unsafe to camp upon it. Sergeant Brainard was sent, with Schneider, to determine the possibility of following at once a route to the westward, which had been considered by Dr. Pavy as practicable. They both reported it impossible to move in that direction, when Dr. Pavy became so abusive to Schneider, because he deemed the route impracticable, that I was obliged to interfere. I felt, however, the great importance of making westing, and, despite the discouraging reports, sent Lieutenant Lockwood, Brainard, and seven men, with the ice-boat, to examine farther. They visited the floe already referred to, and two others to the west and southwest, which proved to be of last year's ice, over which travel is impossible with any load.

"They experienced a great deal of danger and trouble, owing to rubble, slush, and rotten ice. In clearing the slush ice in front of the boat, so as to permit their return, our only shovel was unfortunately lost. From bearings, at 9 A.M., we are on the meridian of Brevoort Island. The fresh northwest wind which set in is undoubtedly carrying us to the eastward, and will be exceedingly dangerous to us if it continues, but movement in any direction is yet more perilous. We have done our utmost, and must now rely on Providence."

"September 25th.—I called the cooks at 4.30 A.M., but we could not move owing to a northeast gale, with snow, with a temperature of 10° (−12.2° C.). I anticipated this delay from the continual grinding of the ice last night. The pressure of the pack was exceedingly heavy, and it was fortunate that we were on a palæocrystic floe, and had not ventured on one of last year's ice. About 1 P.M. the pressure of two large palæocrystic floes split our own in two, leaving us on a small bit of the original floe, which is only two to three acres in extent and from thirty to forty feet thick. The main floe drifted away before we could transfer to it. Our situation now is extremely critical, as the wind shifted an hour ago (3 P.M.) to the northwest, and is increasing in violence, so that we are slowly but certainly being set off shore toward the centre of Smith Sound. We are now (4 P.M.) distant about three miles from Brevoort Island, in a northeasterly direction, and must certainly drift past it if this wind, as is probable, holds. Several of the party are troubled with diarrhœa, and Cross reports his second foot frosted so that he is unable to do any pulling.

"Later.—The wind increased by 6 P.M. to a violent northwest gale. About that time we crowded up against a palæocrystic floe to the west, from which we are separated by huge masses of slush and rubble ice for about an eighth of a mile. I sent Christiansen to attempt a crossing, in hopes that there might be a chance of our passing to the floe. He got over with great difficulty, and in returning nearly fell through several times.* To attempt such a passage with our loaded sledge would be madness. At 10 P.M. total darkness came, but as the

* The fine, broken ice, called slush, and rubble ice was occasionally held so firmly together by the pressure of floes as to permit a man to cross upon it. In this case the pressure was hardly sufficiently strong for that.

storm yet increased in violence and the entire destruction of the floe was feared, I detailed a watch, which was only able, however, to report our continued south-southeast drift, and that we could land at Breevort Island at early dawn if the wind died down."

"September 26th.—At 8 A.M. we were several miles east of Stalknecht Island, drifting rapidly southward. Dr. Pavy thought something might be done toward reaching shore. Though I did not agree with him, I directed Rice and Schneider, the most experienced sailors of the party, to examine the strip of water to the westward. They reported there was such a sea in the small pool that a boat could not live in it, and such heavy waves were breaking that they could not reach within fifteen or twenty feet of the edge of the ice, while on the other sides our floe was being steadily ground into fragments. Rice was ordered to keep watch of the opening, and later he reported slush ice so thick between the edge of the floe and the open water that a well-manned boat could hardly have gotten through it, even without a load. As it was calculated that nine hours would be necessary to have landed the party, it is evident what would be the fate of the party left behind if I consented to a trial.

"Lieutenants Lockwood and Kislingbury and five others are affected by diarrhœa, so, after consultation with the doctor, I have decided to change the diet to salt meat.

"1 P.M.—A large palæocrystic floe is crowding us badly, and has cracked our floe repeatedly. I feel obliged as a matter of prudence to move to the floe north of us, although it is now blowing a gale and the passage from this floe to the other over the rubble ice must necessarily be dangerous, entailing possible separation and loss of men and supplies. It also obliges the whaleboat crew to abandon the ice-house, which has afforded them excellent shelter."

"Brainard described the condition accurately: 'The cooks were called long before daylight, that we might be ready to take advantage of any opportunity as the first streak of dawn appeared. But daylight revealed the land fully six miles away, and for a third of the distance the sea was covered with débris ice, through which no boat could be forced, and the seething, foaming ocean beyond would have swamped us in a moment.'

"September 28th, 8 A.M.—We have suffered so intensely from exposure that I have been unable to note events since the 26th. As I closed my notes the gale increased in violence, causing such conflict between the heavy floes as it is beyond the power of language to describe. Our own floe, as I have recorded, was from forty to fifty feet in thickness, and yet it tumbled and cracked like chalk under the tremendous pressure of the surrounding floes. As the edges of these immense masses of ice ground against each other, with terrible groanings and almost irresistible force, their margins were covered for several rods with thousands of tons of broken ice, which arranged itself in the shape of irregular mounds, whose apexes marked the margin of the floe. A slight change of direction and the two floes parted, when the mountain of ice dropped instantly into the sea, leaving fringes of ice from ten to twenty feet high along the edge of each floe.

"Just as the whaleboat party quitted their snow-house, one of these repeated shocks, of unusual violence, split our floe again, opening a wide crack, which soon swallowed up a portion of the abandoned house. Even as we rapidly rolled up the tepee, a narrow crack formed under our feet. Fortunately, at that time an immense floe to the northward was setting, with tremendous pressure, against our own floe, from which it was separated by some fifty feet of small rubble ice, that was held together simply by the pressure. The slightest movement of

THE CRUSHING OF OUR FLOE—SEPTEMBER 30, 1883.

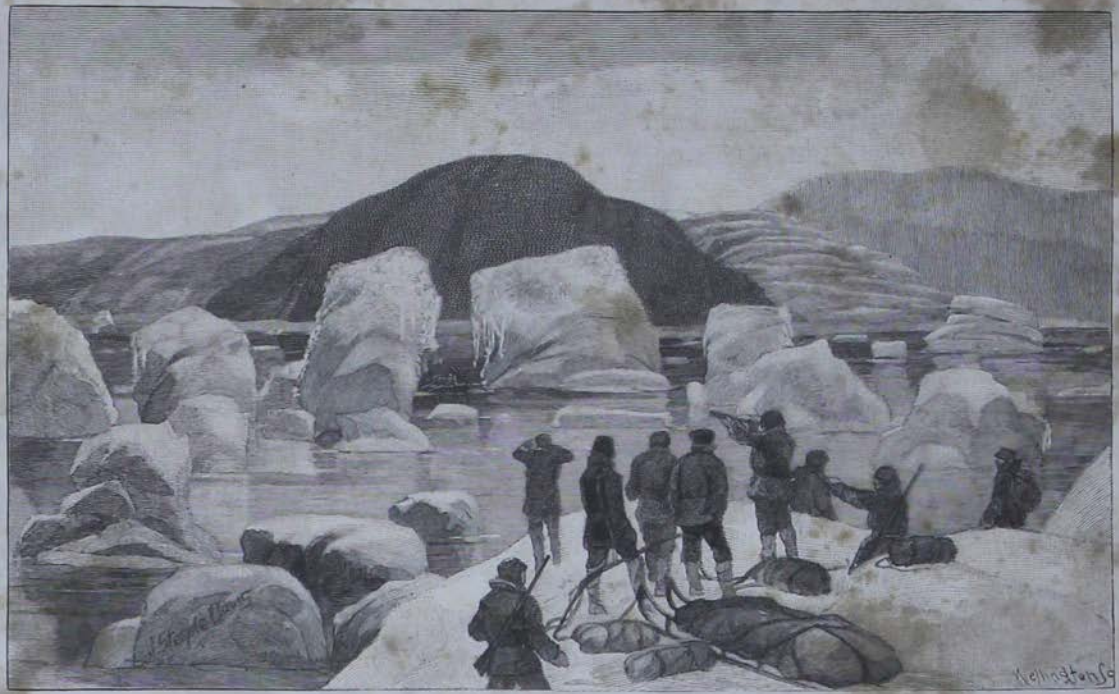
either floe would open this rubble so that the sea would swallow up any one on it. It was a hazardous passage, not to be thought of under other circumstances, but in our desperation it afforded the only possible means of escape. With wonderful celerity boat, sledge, and provisions were rushed across the chasm; the articles of least value being left till the last. Even as the last man passed over the rubble the floes moved, and one man just escaped dropping through as the lessening pressure opened again the pack.

"Our condition, as we stood on our new floe, was wretched in the extreme; for, although the temperature was about 15° (−9° C.), yet a northwest wind, with a velocity of nearly fifty miles an hour, not only chilled us to the bone, but filled the air with drifting snow, which insinuated itself even, as it seemed, through our garments. As sheltered a place as possible was selected for our new camp, behind some high, blue-topped hills. The whaleboat crew placed their sleeping-bags on the sledge in the rear of a berg, where they were covered by a small sail. They came to supper with us in the tepee on the 26th, but since that time (forty hours) have remained in their sleeping-bags, with nothing but a small piece of pemmican and a drink of rum, which latter some refused until this morning. They preferred their present great discomfort to the increased suffering which they would have been caused by leaving their bags during the violent gale. The wind and drifting snow continued with unabated violence all the 27th, and though now high, yet lulls occasionally. On the morning of the 27th it was impossible to cook, so a small quantity of frozen pemmican was given to the men in their bags. With great difficulty supper was cooked last evening, at which time the snow which had filled the tepee and covered our bags was shovelled out. The cooking in the tepee made the temperature so high that every sleep-

ing-bag is completely saturated, much to our discomfort. The Valorous was filled with snow, but its crew was the most comfortable of the party; all were exceedingly wretched, however, and those in the whaleboat even more so than the rest of us.

"From appearances this morning we are embayed in Baird Inlet, and have not moved over a mile since yesterday morning, and that to the southwest. The channel must be densely packed toward Greenland, since a violent northwest gale forces us to the southwest. A wide lane of water shows up to the westward between us and a large palæocrystic floe, which it is of vital importance for us to reach as soon as the subsiding gale permits. Sergeant Rice, in anticipation of a change, has gone, by my orders, to watch the sea and report when it is low enough to enable the lead to be crossed without serious danger.

"Later.—Sergeant Rice reporting that the sea had gone down, so that it was possible to cross with small loads, I immediately moved the entire party and a portion of our provisions to the edge of the floe, and sent Rice, with our best sailors, to the next floe while we went back for the balance, the sea being so rough and the wind so high that four loads were necessary. It proved to be a large, fine, palæocrystic floe, affording such good travelling that we succeeded in moving everything but the boat in one load to a floe beyond it, which is evidently caught and held fast by a grounded berg. We feel that our miraculous preservation from a drift into Baffin Bay, and the death it threatened, is an intervention of Providence in our behalf. We are prevented from going farther to-night by weak, young ice ahead, and the party are too much worn out to admit of it. I was reluctantly obliged to leave the boat nearly two miles behind us for the night, on the edge of a large floe to the eastward. Our day's work has been prosecuted with extraordinary energy, and insures our reaching land in any event; as, in case of



LANDING AT ESKIMO POINT—SEPTEMBER 29, 1883.

any movement in the floe on which we are now camping, I shall take refuge with the entire party on the large floeberg against which this floe crowds, and under which we now rest. A bold, high, rocky island is the land we seek, hemmed in by glaciers and snow-covered land. As soon as we reached the solid floe, and our safety seemed assured, I detached the two Eskimos as hunters. They have seen several seals, a half dozen walruses, and the tracks of a bear; and, although no game has been obtained to-day, yet we feel confident of the future."

"September 29th.—I called the cooks at 4.30 A.M., and also started Sergeant Brainard, giving him orders to reach land if possible, and return over the same route to us. Land is scarcely more than a mile distant from our present camp. He shortly returned, and reported that he had gone nearly a mile, and had come to a lane of water, adjoining which was young ice not thick enough to bear the sledge. I immediately started the party back, when we brought up our boat, and after breakfast moved toward land. We were obliged to ferry across two lanes of open water, and then were fortunate enough to strike fast ice, extending from us to land, which was nearer three miles than one from camp. Lieutenant Lockwood was in charge of the first party, and touched land at 5.20 P.M., while I was the last to cross the lanes of water and to reach the shore. The point reached is a portion of the main-land, although we have until attaining it thought it to be Leconte Island. Two eider ducks and a raven were seen yesterday, as well as many walruses. A large number of walruses were seen to-day. I have had both of the Eskimos hunting, but they were unfortunate and secured nothing, though Jens succeeded in wounding a walrus on the ice. The men were very tired on reaching shore, being quite exhausted by the efforts made since the storm. The point we are on consists of nothing but immense boulders of

granitic rock, piled one upon another; but it is solid land, and all are exceedingly thankful to have it under foot once more. No ice-foot exists along this coast, and travel is only possible on the main floe."

Of our long struggle to reach the shore, I can only add that many occasions of great peril came on days so eventful that time and strength failed with which to even allude to them in my diary, and their story can never be fully told.

The retreat from Conger to Cape Sabine involved over four hundred miles' travel by boats, and fully a hundred with sledge and boat; the greater part of which was made under circumstances of such great peril or imminence of danger as to test to the utmost the courage, coolness, and endurance of any party, and the capacity of any commander. As to my officers and men, it is but scant justice to say that they faced resolutely every danger, endured cheerfully every hardship, and were fully equal to every emergency (and they were many) of our eventful retreat. If adverse and harmful criticism came from the lips of some in seasons of peril and forced inaction, save in one instance alone, I never failed to receive the promptest obedience on march or in action.

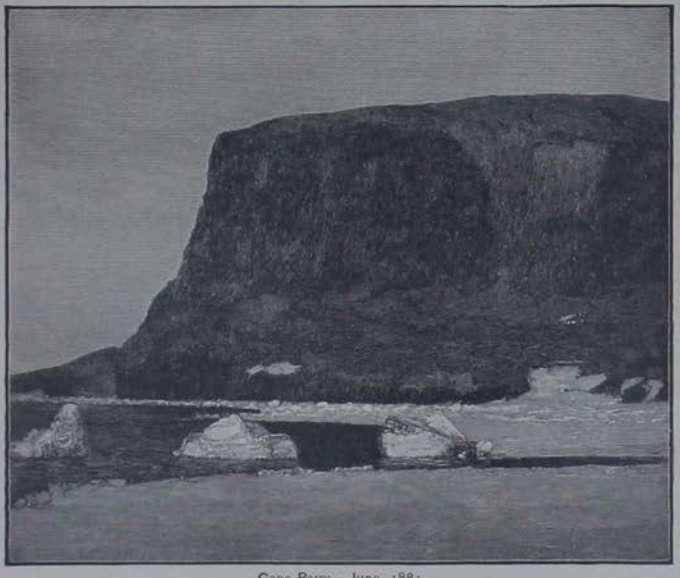
Without doubt all my decisions and orders were not without flaw or error, but I am conscious of no serious one. At all events, after fifty-one days and five hundred miles of travel, I landed near Cape Sabine not only my party, in health and with undiminished numbers, but its scientific and private records, its instruments and its baggage, with arms and ammunition sufficient, in a land fairly stocked with game, to have insured our lives and safety.

CHAPTER XL.

NEWS OF THE PROTEUS.

"SEPTEMBER 30th.—Eskimo Jens last evening shot a large seal, which immediately sank; he has hunted all day without success, though he saw many walruses. I sent Corporal Salor and Christiansen to visit the cape on the south side of Rosse Bay, thinking some cache might have been made there if a vessel could not reach Cape Sabine. They returned at 5 P.M., having been unable to get to the shore, owing to a lane of water with moving ice a half mile from the cape. Once during their absence they were on the moving pack, and escaped to the fast ice with difficulty. There was no cairn or signal to be seen on the Cape. Salor brought in a sea-cucumber and a clam, or mussel, such as walrus feed on. Expecting that Corporal Salor would reach the shore, I issued orders to Lieutenant Lockwood to prepare for a trip to Cape Sabine to-morrow with the twelve-man sledge. Corporal Salor's experience proved the impracticability of such a trip, and I countermanded the order. Sergeant Rice then proposed to take a one-man sleeping-bag, and endeavor, with Jens, to reach Cape Sabine on foot. I gave the necessary orders for his outfit and journey, and prepared records which were to be left in the cairn at Brevoort Island. I climbed the promontory, a huge mass of crags without a vestige of vegetation, at the base of which we were camped, and found it to be about eight hundred feet high. From its summit the only water in sight were a few continually changing lanes to

the east and southeast. The day was so clear that I could not only see Cape Alexander plainly, but also Wostenholme Island, nearly eighty miles distant. Beyond I was uncertain, and doubtful as to the identity of the high land back of Cape Parry. To the north of Cape Alexander was visible the indentation known as Life-Boat Cove, in which the abrupt, rocky summit



Cape Parry.—June, 1884.
[*From a Photograph.*]

of Littleton Island attracted my attention. Was there a relief party at the appointed place, and would we be able to reach them or they us? On these contingencies our future safety seems to depend."

"October 1st.—We are camped on a point a short distance above Wade Point and just below Alfred Newton glacier. Lieutenant Kislingbury hunting, crossed the glacier to Rosse Bay,

which he found to be open for half its extent. He reports the Admiralty chart the better of the two we have. Both he and Salor say that Leconte Island is very small, and is situated off the northern end of an off-shoot of Lefferts glacier. Lefferts glacier in the main discharges into Rosse Bay, but off-shoots come into the south of the bay, being turned by the promontory. I examined several sites for permanent winter quarters, but found none which was really good, though we shall probably move to a low plateau on the south side of Alfred Newton glacier and about a mile distant.

"Rice and Jens started, at 8.40 A.M., for Cape Sabine, taking with them a record to deposit in the cache. They carried with them a large single-man sleeping-bag, into which the two can barely crowd, and four days' rations, expecting to subsist at Cape Sabine and during their return upon the English supplies at that point. They go over glacier, by the overland route discovered by Lieutenant Kislingbury, to Rosse Bay; thence by glacier or land as may be practicable. Ellis and Whisler, who assisted them with their packs, returned about 6 P.M., having gone as far as Rosse Bay, where the southerly gale was very violent. Sergeant Rice sent back word to me not to be alarmed if he was not back until October 9th. The gale which sprang up last night has opened the straits very much, but gives us very bad weather, bringing with it such relatively high temperature (about 26°, or—3.30 C.) as to melt the snow and ice under us and saturate everything. We have, owing to the gale, remained in our bags most of the day.

"Sergeant Gardiner's finger causes him such great pain that he is hardly able to sleep. I am obliged to give him special diet, and an extra allowance of bread and butter, to which he reluctantly consents. He injured his finger severely during the retreat, and constant use prevented its healing; and finally, his

extremely arduous labors with an oar the day we landed so aggravated its condition as to induce a felon, which the doctor says may cause the loss of the finger.

"Long killed a walrus in a water-pool, and was able to touch him with a pole, but unfortunately could not get him within reach before he sank. This encourages us, as we could live through the winter if we could secure a couple of walruses. I decided to remain here for the present, and so I sent the officers and Brainard to examine and report on the various projected sites for our winter huts. They unanimously agreed that a point just south of Alfred Newton glacier would be the best.

"If we had a second boat, I should not hesitate as to the course to be pursued. I should here cache our instruments, records, and all other articles not indispensable for a boat journey, and follow this coast (Ellesmere Land) south to Clarence Head; whence it is but fifty miles (by our chart) to the Cary Islands, where we would be safe. If ice prevented that passage, it would be but seventy miles farther, with prospects of open water, to North Devon, where the Pond Inlet natives are occasionally to be found. With one boat this idea is futile, however; and, during Rice's journey to look for succor or provisions, I deem it best to build permanent huts, while our hunters, searching for game, may obtain two or three walruses, which would insure our safety here. With the latter view, Bender is now trying to fashion a harpoon head from a piece of my sword, with which to kill and secure them. On abandoning the launch we brought along an assortment of tools, which, in the hands of our skilful mechanics, are sufficient for the making of all essential articles.

"The sun is so low in the heavens, even at midday, that Israel could not get our latitude to-day."

It may seem strange to uninformed readers, that my diary

in those days makes no mention as to the non-feasibility of crossing Smith Sound to Littleton Island, and the expected relief party or the Etah Eskimos. The impossibility of such a passage was so patent to every one, that not even the most querulous and unpractical of the party ever suggested it. The conditions were as follows: Smith Sound in shape resembles a partly opened fan, the open part to the southward, and has a southerly running current of four to eight miles per day. Our experience of eighteen days had proved that, even when working for our lives, we could not average more than two miles daily across a moving pack. The chances of crossing a channel twenty-five miles wide at the narrowest part, by travelling two miles to the east and drifting four miles to the south, where the channel soon became fifty miles wide, are obvious. The conditions which prevented twenty-five active men, who had just passed successfully through an experience of over four hundred miles of ice navigation, from considering this alternative were, first, strong tides, rising and falling from ten to twelve feet every six hours, disrupting and twisting the pack in all directions; second, the character of the pack itself, as it consisted of infrequent palæocrystic floes, with much rubble and slush ice; third, continued strong gales; fourth, the constantly forming new ice, which was sufficiently strong to impede the passage of boats and speedily cut them down, while it was not sufficiently strong to bear the weight of either boat or man.

On October 15, 1872 (two weeks later in the year), thirteen of the crew of the Polaris, nearly all able-bodied and first-class seamen, were stranded on a floe in sight of our camp. Though only five miles from shore, the report of the investigating board of the Navy says: "They made several attempts to reach the land with their boats, but failed, notwithstanding their most persistent efforts, owing to the obstruction of the

ice and the violence of the wind." With the aid of Providence we had once made shore, eleven miles distant, in these very waters; and all concurred in avoiding a second Polaris drift, which could hardly have resulted in the arrival of a second Tigress at an opportune moment.

"October 2d.—Three foxes were seen this morning, and one yesterday. Five shots have been fired at foxes with no result, save to alarm them. In order to husband our ammunition and insure our obtaining game, I have ordered that the two Eskimos, Lieutenant Kislingbury, and Private Long be considered as the hunters, and that others should serve only on special occasions. The southerly gale continues in the straits, but the wind here is now quite feeble. Although the day was bad, and the ice over which we were to travel slushy, and possibly dangerous, I decided to move the party to the site recommended by the officers for camp, which I have examined and determined on. Everybody appreciates the importance of being in quarters at the earliest moment. I find that we now have rations for thirty-five days, of about the same nutritive value as those lately issued; *i.e.*, ten ounces of bread, one pound of meat, and two ounces of potatoes—thirty ounces of solid food, about half an Arctic ration. I count on two hundred and forty English rations at Cape Sabine to supply food for an attempt to cross to Littleton Island, in case absolute starvation drives us into the pack. The southerly current forbids all hopes of reaching Greenland, though we might possibly make the Cary Islands. There was much water in the straits last evening, and a lane extended as far as could be seen, about ten miles, toward Littleton Island, but by nine o'clock the flowing tide filled it from the south.

"The men were all consulted by me yesterday, and in general wished that these thirty-five days' rations should be made to

last fifty days. There was much discussion over the matter, as the doctor was unwilling to commit himself to any definite reduction—a course which is embarrassing to me. Finally, I decided to cut down the bread and potatoes, and shall issue, for forty-five days (making a farther reduction after we are in winter quarters), a ration of six ounces of bread, two and a half ounces of potatoes, twelve ounces of pemmican or bacon (or, in lieu, one pound of seal-meat or twelve ounces of corned-beef), and one ounce of extract of beef. Of course, we expect to add to our supplies one hundred and forty pounds of meat from Cape Isabella, and the supplies which I believe our own Government must have landed on this coast for us. At the worst, we have food enough to wait until November 16th for the straits to freeze over, and I believe we shall be able to tide over the year 1883 in any event.

"We moved part of the camp, with rations for several days, to a point about five hundred yards south of Alfred Newton glacier. I was obliged to reprimand Elison severely, in the presence of the party, for reflections made by him upon Lieutenant Lockwood, in my absence, and which Lieutenant Lockwood brought to my notice. Elison afterward deprecated the language used by him, and plead in extenuation what others had said. This indiscretion, on the part of one of my best men, illustrates forcibly the demoralizing influence of the improper criticisms already made by his superiors. High water to-day, the moon being full, at 11.40 A.M. (W. M. T.); watch probably three or four minutes fast. We pitched the tepee in our new camp, in which twelve slept. The Valorous party, with Lieutenant Kislingbury, occupies the boat. Gardiner is suffering very much from a felon, and in consequence I gave him my sleeping bag, and allowed him to take my place in the tepee, where he will be sheltered from the weather. I take his place with

the whaleboat party, in a bag with Jewell and Rice. I gave the rest of the whaleboat party an opportunity of trying to crowd one three-man bag into the tepee, and to put the others in the Valorous. They preferred, however, sleeping out, until a house can be put up, rather than crowd in and make the other parties miserable; and, in consequence, we are lying on a naked rock, unprotected from wind and snow."

"October 3d.—I selected a general site for building; and, as there was a variety of plans proposed for constructing the houses, I permitted each squad to build its own house in accordance with its own ideas. The party is divided between three houses—my own, Lieutenant Kislingbury's, and Sergeant Brainard's—in assignments to which the wishes of the men have been consulted as far as was practicable.

"The boat, with two oars, rudder, and boat-hook, was disposed of by lot, and fell to Sergeant Brainard's party. I ordered that it should be so used, in constructing the houses, that its future serviceability should not be impaired. Everybody worked very hard and cheerfully during the day. My own party will first put up an ice house, and then construct a stone one inside. The others have decided to build stone houses first, and then surround them with ice. Our house will be eight feet by eighteen in the clear. We nearly half finished our ice house to-day. Many Eskimo caches and a number of relics have been found in and around these permanent houses. Among other articles was a toggle of walrus ivory for dog-traces, a narwhal horn, and large bones of the whale. Light snow and a north wind. Much open water in Smith Sound. A snow-bunting was seen to-day."

"October 4th.—Our ice wall is substantially done, and the stone wall commenced. Stopped work at 2 P.M., and hauled a load from our old camp. The temperature to-day has been down to

6° (−14.4° C.), and at 4 P.M. was only 8° (−13.3° C.) In accordance with the doctor's advice, I increased the ration, commencing this evening, to four ounces of pemmican, eight ounces of bread, and one and a half ounces of potatoes, which is to last until we are through with the present hard work. The hunters are not working upon the houses, but are out for game. Long saw many walruses in the straits, all in the open water."

Our condition at this time is perhaps best indicated by an extract from Lieutenant Lockwood's diary. He says: "Our tea is extremely weak. This is a miserable existence, only preferable to death. Get little sleep day or night, on account of hard sleeping-bag and cold."

Lieutenant Lockwood's remark about weak tea recalls the device by which our tea was made to last. As soon as one-half was issued, Sergeant Brainard advised me, and I reduced the ration one-half; and repeated the reduction until the tablespoonful at first allowed daily to each man had fallen to one-eighth of that amount.

"October 5th.—Very hard work on the huts until 2 P.M., when I, with most of the party, hauled in the balance of the articles from the old camp.

"Our house has its stone walls nearly completed. Four ptarmigans, flying from the north, alighted near the camp, and were shot by Cross this afternoon."

Lieutenant Lockwood says: "We have now three chances for our lives: First, finding American cache sufficient at Sabine or at Isabella; second, of crossing the straits when our present rations are gone; third, of shooting sufficient seal and walrus near by here to last during the winter. Our situation is certainly alarming in the extreme. Lieutenant Greely is sleeping out, while Gardiner is occupying his bag in the tepee. We find it very severe work building with these rocks. We are all

weak, and the rocks are granite, very heavy, and not easily obtainable."

"October 6th.—Divided this morning between the three parties the canvas, oars, poles, etc., which were arranged as equitably as possible in three piles by Lieutenant Kislingbury and five others. In order to avoid any chance of complaint, I had my immediate party take the last choice, so Lieutenant Kislingbury and Private Schneider drew lots for the first choice. We have placed a canvas temporarily on our hut, and are now in it. Israel accused Brainard of unfairness in dividing the canvas and other articles, for which I reprimanded him, pointing out how thoroughly he was in the wrong, and he seemed to regret his words. It is his first indiscretion since his services with me, and can be readily attributed to his nervous frame of mind, growing out of hard work, insufficient food, and severe exposure, which affects him, the youngest and weakest of the party, more than any other. Two seals were shot to-day, but only one secured—that of Christiansen, which weighed about one hundred and fifty pounds. We are cooking with stearine, the fumes of which seriously affect our eyes and lungs. The huts have been built of heavy stones, which, with bare hands, we have been obliged to dig from the snow and ice, and carry in our arms to the site. My hands are bruised, bleeding, and swollen, joints stiff and sore, clothing badly torn, hand-and foot-gear full of holes, and my back so lame I cannot stand erect. The work has taxed to the utmost limit my physical powers, already worn by mental anxiety and responsibility. All the officers have worked with the same assiduity and constancy, except Lieutenant Kislingbury, the hunter, who also labors zealously at times when not hunting."

"October 7th.—Mrs. Greely's birthday; a sorry day for her and a hard day for me, to reflect on the position of my wife and children should this expedition perish as did Franklin's.

However, I hope in faith that we shall succeed in returning. We will at least place our records where our work will live after us. I drank Mrs. Greely's health in a half gill of rum, which I had saved from previous issues. Israel to-day apologized to me in a manly, touching way, and in words which were very affecting, for his injustice to Brainard. Reprimanded Salor for his part in recent complaints, for which he expressed the most sincere regret. Was also obliged to take Connell seriously to task for frequent and similar expressions of discontent. I told Sergeant Brainard that I had most implicit faith in his fairness, equity, and impartiality in the issue of rations, as well as in other matters; indeed, I think him a model of fairness. We are now housed, having four inches of moss under us, which we collected with great difficulty from under the snow. The walls are also chinked with moss. I expected Rice and Jens back to-day, and sent Ellis and Whisler, without success, to Alfred Newton glacier to meet them. Long and Christiansen shot a walrus on the ice; but, to their despair, the animal had just life enough to crawl into the water. Christiansen shot a ptarmigan."

"October 8th.—I am very anxious about Rice, owing to the recent bad weather, and its being impossible to reach him with a sledge. Our party collected a large quantity of moss for the roof, and also added more to our bed. Christiansen shot two seals, which unfortunately sank before they could be reached by kayak. A cunning fox stole a little bread last night."

"October 9th.—Lieutenant Lockwood's birthday. It was occupied by us chiefly in collecting moss. I visited the Alfred Newton glacier this morning. It projects a considerable distance into the sea. I find that the pieces detach themselves by flotation, and not by falling. Its highest face above the sea was thirty feet, and the lowest three feet. There was a large floe,

about eighteen feet out of water, in front of the centre of the glacier, from which it had evidently detached itself lately.

"Later.—An eventful day. Sergeant Rice, whom Lieutenant Kislingbury had gone over the glacier to meet, was reported returning, from the front of the glacier. As he said, he brought both good and bad news. The Proteus sank July 24th, this year. Her crew and Lieutenant Garlington had gone south, hoping to meet the United States steamer Yantic or a Swedish steamer. There are about thirteen hundred rations at or near Sabine. Rice also, wonderful to say, found our whaleboat at Payer Harbor, safe and whole, the floe having caught between Cape Sabine and Brevoort Island as it drifted southward. Rice reached Payer Harbor by a tortuous route around a strait [Rice Strait], which connects Rosse Bay and Buchanan Strait; thus separating Cape Sabine from the main-land, and making it an island (Bedford Pim Island). Rice accomplished most successfully this dangerous and difficult trip, and found a practicable sledging route on his return. I have decided to move to Sabine, abandoning our winter quarters here. It is impossible for us to haul the ten to twelve thousand pounds of articles at Cape Sabine to this place, as I could wish. Our chances for game are superior here, but we look for possible assistance at that point. I am so thankful to be assured of the health of my wife and children, from the note 'Your friends are all well,' of the records of 1882 and 1883.

"These records make our fate seem somewhat brighter, and the party are in very high spirits over them, feeling certain we can get through somehow. I, however, am fully aware of the very dangerous situation we are now in, and foresee a winter of starvation, suffering, and probably death for some. The question is, did the Yantic reach Littleton Island; if so, we are safe. Our fuel is so scanty that we are in danger of perishing

for want of that alone. I am determined to make our food last until April 1st, and shall so divide it; supplementing it from any game that we may kill. Rice discovered three caches—the English one of two hundred and forty rations, the Beebe cache of 1882 (containing boat), and the wreck cache of the Proteus. He and Jens killed a fox while absent. I have ordered Lieutenant Lockwood to start to-morrow morning, with the twelve-man sledge, and haul a load of our supplies to Rosse Bay, expecting to haul the balance on the day following."

The record brought back by Rice comprised a notice of the proceedings of the Beebe expedition of 1882, and the following notice from Lieutenant Garlington, as to the loss of the Proteus and his intended movements:

UNITED STATES RELIEF EXPEDITION,
CAPE SABINE, July 24, 1883.

The steamer Proteus was nipped midway between this point and Cape Albert, on the afternoon of the 23d instant, while attempting to reach Lady Franklin Bay. She stood the enormous pressure nobly for a time, but had to finally succumb to this measureless force. The time from her being "beset" to going down was so short that few provisions were saved. A depot was landed from the floe at a point about three miles from the point of Cape Sabine as you turn into Buchanan Strait. There were five hundred rations of bread, sleeping-bags, tea, and a lot of canned goods; no time to classify. This cache is about thirty feet from the water-line, and twelve feet above it, on the west side of a little cove under a steep cliff. Rapidly closing ice prevented its being marked by a flag-staff or otherwise; have not been able to land there since. A cache of two hundred and fifty rations in same vicinity, left by the expedition of 1881; visited by me and found in good condition, except boat broken by bears. There is a cache of clothing on point of Cape Sabine, opposite Brevoort Island, in the "jamb" of the rock, and covered with rubber blankets. The English depot on the *small* island near Brevoort Island in damaged condition; not visited by me. Cache on Littleton Island; boat at Cape Isabella. All saved from the Proteus. The U. S. steamer Yantic is on her way to Littleton Island, with orders not to enter the ice. A

Swedish steamer will try to reach Cape York during this month. I will endeavor to communicate with these vessels at once, and everything within the power of man will be done to rescue the brave men at Fort Conger from their perilous position.

The crew of the Proteus consisted of Captain Pike and twenty-one men; my own party of Lieutenant J. C. Colwell, U.S.N., Acting Assistant Surgeon J. S. Harrison, five enlisted men of the line of the army, two Signal Service men, three Newfoundlanders, and two Eskimos.

It is not within my power to express one tithe of my sorrow and regret at this fatal blow to my efforts to reach Lieutenant Greely.

I will leave for the eastern shore just as soon as possible, and endeavor to open communication.

E. A. GARLINGTON,

First Lieutenant, Seventh Cavalry, A.S.O., Commanding.

This record speaks in varying ways; but to the party and to me it meant that we could rely upon it that "everything within the power of man" would be done to rescue us, and on the strength of that promise I at once decided to proceed to Cape Sabine and await the promised help. My journal shows that I looked forward to privation, partial starvation, and possible death for a few of the weakest, but I expected no such thing as an abandonment to our fate.

We now had four boats, and, although the sun was about leaving us for the winter, we could yet travel southward, there being open water visible at Cape Isabella. Had I been plainly told that we must now depend upon ourselves, that trouble and lack of discipline prevailed among the Proteus crew, that the Yantic was a fair-weather ship, and that its Commander and Lieutenant Garlington were acting independently of each other, I should certainly have turned my back to Cape Sabine and starvation, to face a possible death on the perilous voyage along shore to the southward.

CHAPTER XLI.

GOING INTO WINTER QUARTERS.

"OCTOBER 10th.—Called the cooks at 4 A.M., but the fast-falling snow prevented the party moving. I spent a half hour over the "Army Register"—which is the only thing found by Rice containing news—and succeeded in gleaning a great deal of information from it, including important railway extensions, such as the completion of the Northern and Texas Pacific railways; Garfield's probable recovery; and an extraordinary state of political affairs, which kept Congress in session until August 7th. Rice proposed that I permit him and Christiansen, with a sleeping-bag, to go to Isabella, in the hope that the Yantic has left supplies there for us. It is a dangerous, and will be a very trying, trip; but, although not anticipating much from the journey, I decided to send him tomorrow."

I did not then believe that the Yantic had reached Littleton Island, not realizing that any officer of our navy could leave Smith Sound under the circumstances without cacheing one ounce of provisions, even though he "had no fears for Lieutenant Greely, who, living in a region reported well stocked with game, had economized his provisions."

"October 11th.—Rice started at 5.30 A.M. for Cape Isabella, and Lieutenant Lockwood's party for Rosse Bay. I went in the drag-ropes with the latter party for two miles, until the late members of the party caught up with the sledge, when I returned to the camp, examining again the Alfred Newton

glacier on my way. The temperature fell to —7° (—21.7° C.) last night, and was —4° (—20° C.) when the party started this morning. We leave here, for an emergency and in serviceable condition, the ice-boat and oars; which, indeed, we could hardly haul. Travelling was quite good, and Lieutenant Lockwood's party was back at the camp at 3 P.M. Cross took advantage of the party's absence to get under the influence of liquor, which he succeeded in obtaining somehow without the knowledge of Bender, who was looking after it. What can be done with such a man? Two foxes shot at this morning without success, but Long killed a seal, which is about the same size as the last, one hundred and forty pounds gross."

"October 12th.—Started at 8.15 A.M. for Cape Sabine, with the twelve-man sledge, the temperature then being —8.5° (—22.5° C.). The minimum last night was —12.5° (—24.7° C.). At half past two the party reached the cache made by Lieutenant Lockwood yesterday, and went into camp, the weather being threatening at that time, although it had been previously clear and calm. While the travelling was fairly good, the load was so heavy that the party was thoroughly exhausted when they reached camp. I had myself pulled so hard that I could hardly stand, and others were in nearly as bad a condition. We travelled about six miles during the day. We were fortunate enough to find water in a small lake near the camp. Dr. Pavy and Lieutenant Kislingbury were extremely urgent that the rations should be largely increased, advising the English sledge ration, which contains about forty-two ounces of solid food. Although realizing the need of it as thoroughly as any one, I could by no means consent to this large increase, but finally fixed it at twenty-seven and one-half ounces, of which sixteen are meat. Rum was issued this evening, and will be during continued hard work on such low diet."

"October 13th.—Lieutenant Kislingbury and Dr. Pavy this morning strongly urged my abandonment of everything which cannot be hauled at one load, saying that it could be brought up later in the season, and that the party in their present condition could not stand the exertion necessary to haul everything. I declined to follow their suggestions, stating that I was unwilling to abandon either records, instruments, or any part of our provisions, until I was certain of being on the island where the three caches were situated. In consequence, we made two loads and three journeys as usual. Crossed Rosse Bay, and camped at the extreme southeast point of Rice Strait, travelling fifteen miles and making good five miles. We worked eight hours on the road, and about two more loading, beginning before light and ending after dark. The travelling was better than I anticipated, and in consequence we got the two loads across the bay in one day instead of two, as had been calculated. The days are now very short, and we cannot travel, except with difficulty, more than six hours. A very high wind, with a temperature of 3° (—16.1° C.), takes all the little life left in our exhausted men. There was occasional light snow to-day, but the sun showed up for a few minutes, in the shape of a dim red spot, through the fog. There being no soil at the camping-place, we were obliged to sleep upon the rough, uneven rocks, as we did last night. While crossing the bay, we passed at one point within several hundred yards of Lefferts glacier, from which many floes have detached themselves; one being, as I learn from Rice, fully a quarter of a mile square, and at least twenty feet above the sea—in short, a palæocrystic floe. The bay must be very deep, for we passed floes at least twenty-five feet above the water; and as we were near one, an immense mass of ice detaching itself from the foot of the berg, rose swiftly through the water and burst through the

new ice within ten feet of our sledge. The ice was scattered in different directions, causing much alarm at first. If it had come up under our sledge, some one must have been injured. This is a new Arctic danger, even for us, who thought we had already experienced all."

"October 14th.—Called the cooks at 5 A.M., and at 4 P.M., by two loads and three journeys, reached the north end of Rice Strait, about five miles from the previous camp. During the second trip with the sledge, we were obliged to abandon the strait at one point on account of open water, and pull the sledge and load inside the ice-foot for several hundred yards. It was a work of enormous difficulty, owing to high, bare rocks, which nearly ruined the sledge; and the men were thoroughly exhausted by the efforts. We have necessarily run great risks yesterday and to-day in crossing young ice. A single spot too thin would have cost us lives and provisions. Jens spent the day in hunting in the open water of the strait, but killed nothing, although he shot several times. Took up the white fox killed by Rice and Jens on their trip. It had been partly eaten by another fox. We fortunately found water at a little lake near our camp, which ekes out the four ounces of alcohol which *must cook* a day's food. Gardiner's finger has troubled him so much that he is unable to work in the traces, and in consequence I sent him ahead to test the young ice over which we had to travel, much of which would scarcely bear us. As we are now camped on the island (Bedford Pim Island), I decided to-night to cache such articles as cannot be hauled in a single load to our winter quarters."

"October 15th.—The cooks were called about 4.30 A.M., and at 7 A.M., the temperature $-2°$ ($-18.9°$ C.), I left the main party with orders to follow me, and started, with Sergeant Gardiner and Jens, to visit the Garlington cache, and determine the point

at which it would be best to make our winter quarters. I reached the wreck cache in about two hours, and examined its contents as far as was practicable. I was very much disappointed in the contents; there being scarcely a hundred rations of meat, instead of five hundred, as I had supposed from Lieutenant Garlington's record. Passing onward, I visited the Neptune cache, which, covered by a huge drift, had apparently not been disturbed; but, having no shovel, we were unable to uncover its contents. I went down to within a mile of Cape Sabine, and then returned to meet the party. From an examination of the entire coast, it was evident that no better place afforded for quarters than the lake inland from and—near to the wreck cache. About one o'clock I met Lieutenant Lockwood with the party; the sledge had broken down, about four miles from the old camp, by the runner splitting. They were delayed over two hours in repairing sledge and reloading it. The day was clear but cold. Owing to the height of the shore on the south side of Buchanan Strait, the sun never rises at this date above the horizon. We left at our last camp about twelve hundred pounds to be brought up as soon as practicable. About an hour after we reached camp, Rice and Christiansen surprised me by their appearance. Rice reported that he had visited Cape Isabella; that no whaleboat could be found, and only one hundred and forty-four pounds English meat were cached there. The spirits of the party were generally depressed at this announcement, as the greater part of the men were confident that some stores must have been landed at Cape Isabella for us. I have been determined, since landing on this shore, however, to base all plans for the future, as far as is possible, upon such provisions as are actually within our reach. Whatever stores or game we may hereafter find will be an additional guarantee of our future security. Since the Garlington record has misled us regarding the boat at

Cape Isabella, it is an open question whether there is a cache on Littleton Island."

"October 16th.—This was the day on which the sun left us at Conger; but, although we cannot see it at midday, it remains nine days longer above the horizon here, and in that time an immense amount of work must be done by the half-frozen, half-starved party. I sent Lieutenant Lockwood, with a party of eleven men, to haul up the cache made last night, which was done in a little over five hours. He reported the main floe-ice moving at times, and many tidal cracks along the shore. With Sergeants Rice, Brainard, and Gardiner, I visited the Beebe cache, which, with great labor, we succeeded in unearthing from the snow-bank with which it was covered. We found everything in good condition except the boat, which was slightly injured, evidently by a bear. Lieutenant Kislingbury and Jens visited Cape Sabine while we were thus employed. Elison and one or two other men were left in camp to put up a temporary shelter, which we found ready for occupancy on our return. Although a wretched shanty, we were very glad to avail ourselves of it, as a cold northeast wind, with drifting snow-storm and a temperature of 3° (−16.1° C.), caused us to be thoroughly chilled and uncomfortable. Got some Medford rum from the cache, and issued a half gill to each man; it was thoroughly appreciated."

"October 17th.—Up at five o'clock, hours before daylight; and, after a poor breakfast, with most of the party I brought up the Beebe cache, including the whaleboat, to our present camp. The last of the cache was in by half past two. The day has been a very cold and uncomfortable one; temperature −6.5° (−21.4° C.), with a strong north wind and snow, which frosted the fingers and toes of several of the party. This exposure would have tried us in our best days, but now it is nearly death to us. Those who were not engaged in bringing up the pro-

visions occupied themselves in improving our camp, which is somewhat better than yesterday, protecting us from the wind at least. A small lake near by affords us water. A raven has been seen for several days following us from camp to camp. With Sergeant Elison and a couple of others of the party, I searched for and selected a site for our permanent quarters. We build at the only place where it is possible to do so, about half a mile from our present camp, on a little neck of land between a fresh-water lake, fed by a descending glacier of Bedford Pim Island, and the sea. There are many loose rocks, which are available for building purposes, and near by are large snow-drifts, from which snow-blocks can be obtained. With great difficulty we partly cleared the site of the house, and commenced its construction by laying the corner-stones. It is to be twenty-five feet by eighteen in the clear. We are having chocolate and coffee, delicious to us all, but in quantity it is aggravating to starving men. Bierderbick, troubled with a bad attack of rheumatism; Long, with pains in his chest; and Cross, with frosted feet, comprise our list of invalids."

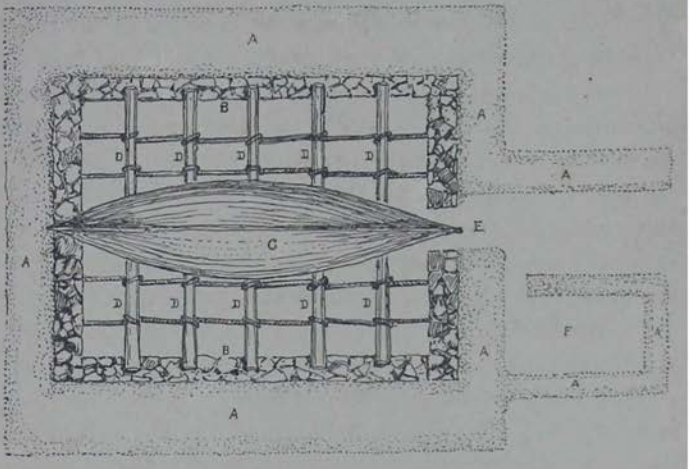
"October 18th.—A wretched, wretched day, with a strong cold wind and drifting snow. The entire party have been at work on the winter quarters, except Long and the Eskimos, who are hunting. The temperature was −6° (−21.1° C.) last night, and but 1° (−17.2° C.) this morning; in consequence several of the men have frost-bitten fingers from the work of yesterday and to-day. My hands are in fair condition, but my heels were badly frost-bitten two days since. Christiansen was fortunate enough to kill a fox to-day. I am feeling badly to-night from a serious blow in the face, accidentally received from an axe-helve too carelessly handled by Whisler, who was energetically assisting me in loosening a rock. In consequence of the cold and pain I can scarcely sleep."

"October 19th.—The whaleboat was brought from our old camp and put on the walls of the house this morning, and a snow wall was commenced around the stone wall already erected. The spaces between these walls are filled in with snow, sand, and gravel. Owing to our short rations, the cold is almost unendurable, and the high northwest wind of to-day has been very trying and disagreeable. The hunters, except Lieutenant Kislingbury, were out to-day, but got nothing. We were able to work less than five hours, owing to darkness commencing so soon. Our work is either carrying snow-blocks cut from drifts near the glacier, or bags of sand from the hill an eighth of a mile away. Our floor is composed of rocks, many of which we cannot get out, and so it is needful to bring enough sand and gravel to fill in and cover them partly at least.

"We have moved into our hut, glad to exchange our temporary shelter for a place where the wind, at least, will not cut us to the bone. It is time to be in winter quarters; no sunshine ever, and a steady temperature of —11° (—23.9° C.)."

The rock walls of the house were about two feet thick and three feet high, outside of which was an embankment of snow, at first four feet in height, but eventually the winter gales buried the house in snow. The whaleboat just caught on the end walls, and under that boat was the only place in which a man could even get on his knees and hold himself erect. Sitting in our bags, the heads of the tall men touched the roof. Holes were cut in the sides of the boat, in which oars were inserted, which, reaching to the side walls and fastened by ropes, supported the canvas and overlying blocks of snow which formed the roof. The method of arranging the boat, oars, and ropes are shown in the plan, the ropes being secured by very heavy rocks at each end. The scarcity of rocks prevented our building higher walls, and snow-blocks were at first insufficient to build snow-huts. The

only space left free, after twenty-five men, with sleeping-bags, had packed themselves in, was that in the centre, between the dotted lines, where cooking was done, barrels sawed up, and exercise taken on very bad days. The thwarts in the boat were used by the cooks for dishes, provisions, etc. The door, four feet by three, was built into the end wall, and opened out on a passage-way which led to the entrance, over which hung a strip of canvas. The commissary storehouse, and passage, with snow



Plan of Winter Quarters at Camp Clay.

A. Exterior wall of snow. B. Interior wall of stone. C. Whaleboat, serving as roof to hut. D. Oars from which the blade has been sawn connected by cables anchored in stone wall, serving as rafters to whaleboat roof. E. Door to hut. F. Commissary.

walls, were covered by canvas. The barometer and Eskimo lamp were fastened to posts, which, placed in the middle, supported the centre of the whaleboat. The stove was used in common.

"October 20th.—The severe storm of wind and drifting snow, with the temperature down to —13° (—25° C.), obliged

us to stop our work of bringing sand to improve the present condition of the hut. Compared with our previous quarters, the house is warm, but we are so huddled and crowded together that the confinement is almost intolerable. The men, though wretched from cold, hard work, and hunger, yet retain their spirits wonderfully. I broached to-day the question as to what should be our winter ration, but leave the point undecided until the English cache reported damaged by Lieutenant Garlington is visited by us. God only knows what we shall do if it is spoiled, this hut will be our grave; but, until the worst comes, we shall never cease to hope for the best."

OUR HUNTER, SERGT. FRANCIS LONG.

CHAPTER XLII.

COLLECTING OUR SUPPLIES.

THE establishment of winter quarters, while an important, was by no means the most important duty which lay before us. It would have been neglected until a later day, but at that time no other work could be done. Three or four hunters kept the field with no success, but the work of collecting the scattered stores at our quarters was not practicable. The Neptune cache, a scant mile to the southeastward, had indeed been brought in with difficulty and danger, as several, myself among the number, had frozen their feet, which had been wet in that work. We had brought in these provisions only by sledging a part of the way overland, as there was no ice-foot yet formed along the rough, rocky coast, and the open water of Smith Sound still extended into Buchanan Strait within a half mile of us.

Our whaleboat, so wonderfully restored to us, was yet on the floe between Brevoort Island and Cape Sabine, while near the cape the cache of clothing, the tea and bread abandoned by the crew of the Proteus, and the English depot remained untouched.

Five days only of sun remained, but the route to Sabine was still impracticable. On October 21st I sent Lieutenant Lockwood, with thirteen others, to Rice Strait, to which point, lying inward, the ice was firm and solid. He took a tent and camp outfit for Long and the two Eskimos, who were to remain at that

place and hunt as long as daylight remained, while Lieutenant Lockwood was to haul back the stores yet cached there. Long had suffered much from chest troubles at Conger, and during the retreat; but his skill as a huntsman, and his great powers of endurance, caused me to send him in charge of the party, when he expressed his willingness to go. The Eskimos thinking it unadvisable to take the kayak, as they were to hunt seal in pools, it was not sent.

My journal * says: "Lieutenant Lockwood's party returned, at 4.30 P.M., very much worn out, having been obliged to drop the sledge and load two miles from camp. The ration on which this hard work and severe exposure is done consists of a pound of meat, eight ounces of bread, and one and a half ounce of potatoes."

The condition of the party is shown by an extract from Lieutenant Lockwood's diary. He says: "We are now in our hut, but it is not yet finished, and is cold and uncomfortable. Our constant talk is about something to eat, and the different dishes we have enjoyed, or hope to enjoy on getting back to civilization. How often my thoughts turn toward home and the dear ones there. We all suppose that Garlington and party are at Littleton Island; but yet doubts will arise as to it. We have found out some scraps of news from slips of newspaper wrapped around the lemons. Each man had a lemon to-night. We are all hungry all the time. Blubber-lamp burning to-night for the first time. Lieutenant Greely, Israel, Bierderbick, Whisler, Bender, and Gardiner are on the invalid list to-day, with sore feet, cramps, and minor ailments. By 3 P.M. it was very gloomy."

I continue from my own journal:

"October 22d.—I sent Rice and three others to Cape Sabine,

* All quotations not otherwise credited are from my own journal.

with orders to bring up as much of the clothing as possible by packs. It is impossible as yet to send a sledge to Sabine, owing to young ice not having yet formed along the shore at points where the current is strong. The exceedingly rugged and broken character of the coast forbids any possibility of reaching the cape by land. Gardiner, Bierderbick, and myself were the only ones who remained in camp. We devoted our time, as far as was possible, to bringing sand and building the outer snow wall. Lieutenant Lockwood, with thirteen of the party, brought in the loaded sledge left yesterday, being absent nearly four hours.

"Ellis' birthday has been celebrated by a punch, which consisted of a half gill of rum—regularly issued of late—flavored with a couple of lemons, and a can of cloudberries. This indulgence, though a small one, greatly benefits the men, improving their spirits. Rice's party on their return brought, among other things, a newspaper article written by Henry Clay, May 13, 1883. The reference to De Long shows the loss of the Jeannette and his party."

Of this Lieutenant Lockwood writes: "We infer the loss of the Jeannette, and the alarming view which must be taken at home of our situation. We all think that our friends regard us as lost. Rice read the paper aloud this evening, and it has excited a great deal of remark. We all think Clay's paper is almost prophetic, except, of course, our lying down under the quiet stars to die. The article gives me pain in the reflection of the great alarm and sorrow felt by my dear father and mother and sisters in my behalf. Should my ambitious hopes be disappointed, and these lines only meet the eye of those so dear, may they not add to my many faults and failings that of ingratitude, or want of affection, in not making more frequent allusions to them and my thoughts concerning them."

The spirit of Lieutenant Lockwood's notes was the same as that which prevailed generally in the party during the entire winter. It was frequently said that those who were near and dear to us at home were more to be pitied than ourselves. We were facing a stern and frightful reality, but they could not fail to be mentally tortured by doubts and fears of every kind.

"October 23d.—Cloudy, with chilling northwest wind and a temperature of −6° (−21.1° C.). As Sergeant Rice reported that ice was forming yesterday along the shore, so that possibly the party might reach Sabine with a sledge, I called the cooks at 4 A.M., and sent Lieutenant Lockwood with eleven others to bring as much of the English cache as possible. In order to insure the safety of the records of the expedition, I sent them and the pendulum, with orders to cache them in a prominent cairn on the south side of Payer Harbor. I know that point will certainly be visited, and that possibly our present camp might be missed by a relief expedition, and all the records lost if left here. I am determined that our work shall not perish with us. Lieutenant Lockwood was directed to leave with the records a notice similar to the one sent by me a few days since to the cairn on Brevoort Island. I ordered that the cache at Payer Harbor be taken up prior to the clothing and tea at Sabine. The days are shortening now so rapidly that it is with difficulty the party can travel from here to Payer Harbor and return, so the cache there must be taken up first. The party was unable, owing to the sledge breaking, to bring in a load to-day farther than Sabine, whence they returned without sledge, having been absent over ten hours. Lieutenant Lockwood and Dr. Pavy each injured a foot while pulling through some pointed rubble ice. Open water and one or two seals were seen in Payer Harbor. Lieutenant Lockwood reports that he has made a very prominent cache, with the pendulum rising from its top, so that no

one visiting Payer Harbor can miss seeing it. It is on Stalknecht Island. The record was left in the sextant box."

"October 24th.—Sent a party to Sabine, which brought in the load by half past five, after ten hours' work. Elison temporarily repaired the sledge at Cape Sabine this morning, and will put it in good order to-morrow. I have told him that the sledge must not only do our autumn work, but must be so strengthened that we can cross to Littleton Island in March, and he has promised that it shall be. Lieutenant Lockwood told me that he had not the heart to refuse the men permission to eat some mouldy bread at Cape Sabine, and I in turn had not the heart to reproach him farther than to say such permission must not be repeated." His journal says: "Allowed the men to eat the mouldy bread out of one of the bags; we ate ravenously."

Our Records and Instruments.
[*Cached October, 1883, on Stalknecht Island.*]

"October 25th.—The sledge broke again yesterday, and was

temporarily patched up, but it was found to be in such bad order that it must be carefully repaired before being fit for further use. Considerable work was done toward the completion of our quarters, by laying blocks of snow upon the roof. Long returned this evening with the two Eskimos. He reports that Christiansen shot a seal, which would weigh about seventy-five pounds dressed. Though half a dozen seals have been seen, only this one has been obtained. Long says that their sufferings have been intense these past few days—ill fed, and without fire or even proper bedding; but he is strong in his determination to remain out while a glimmer of light remains. The sun leaves us to-morrow, but has not been seen by us for the past twelve days.

"As no sledging could be done, I directed Brainard to open the dog-biscuits and ascertain their condition, which was evidently bad." His journal says: "When this bread, thoroughly rotten and covered with a green mould, was thrown on the ground, the half-famished men sprang to it as wild animals would. What, I wonder, will be our condition, when we undergo a still greater reduction in our provisions?"

I recall most vividly my efforts to persuade the men to let alone that mass of corruption, pointing out that the injury from eating such food must be far more certain than any possible benefit could be. In accordance with my instructions the slimy, mouldy substance was thrown away, but I learned later that a few ate all of it.

"October 26th.—Our last day of sunlight for a hundred and ten long days, and how to pass this coming Arctic night is a question I cannot answer. Last evening we had a reading by Rice from the scraps of paper, which I had carefully unwrapped from each lemon and dried out in my sleeping-bag. We have learned, some days since, that Garfield is dead, and that the

Cabinet, except Lincoln, has been entirely changed; we consider Lincoln's retention hopeful for us. The wretched Eskimo lamp, with its faint glimmer of light, is held close to the reader. Some already begrudge the oil for this purpose, but I look on it as more than well spent in giving food for our minds, which, turned inward, these coming months would inevitably drive us all insane. Bierderbick, our faithful steward and cook, when called, at 4 A.M., reported an aurora, which probably is a continuance of the brilliant streamers and arch seen by Brainard last night.

"I sent a sledge party to Sabine for a load, which returned about 2 P.M., reporting that the sledge had again broken down two miles from our hut. The hunters kept out to-day, although the temperature was —7° (—21.7° C.), but saw no game. During the evening I announced to the party what my intended programme was, and invited the opinion of the men concerning it, and also asked for suggestions. I said that the present ration would be continued until November 1st, after which it would be reduced to about six ounces of bread, four ounces of meat, and four ounces of vegetables, etc.; aggregating in all about fourteen ounces. By this means the party could be provided for until March 1st, at which date there would be remaining ten days' rations, on the scale of ten ounces of bread, ten ounces of pemmican, and a small quantity of tea daily, on which to cross Smith Sound by sledge. There was a warm and animated discussion regarding the reduction."

I quote what Lieutenant Lockwood says on the subject: "The doctor urged that a great objection to the reduction of the ration was that our strength might be reduced, that disease, scurvy, etc., would be brought on, and only too late we would find it impossible to recover. I remarked that the general view taken by the party, as far as I could get it, was that our

rations should be reduced to the very lowest limit, and afterward increased enough, if necessary, rather than the contrary. So it seems to be fixed upon that we are to try to make out on our food until March 1st. Then we shall try to cross the straits on ten ounces of pemmican, ten ounces of bread, and tea included."

"October 27th.—Sent a party out for the sledge and load which was left yesterday. Elison and Schneider went in advance of the party in order to repair the sledge. The balance of the party have been engaged in working on the snow wall around the house. Another of the barrels of dog-biscuits, which originally contained one hundred and ten pounds, was examined to-day, and found to be in very bad condition. Fifty-eight pounds only were fit for eating, and all of that was more or less mouldy. The remainder of the biscuits was a mass of filthy green mould, which the doctor declared would be injurious to the party. In consequence I ordered it thrown away, but a number of the party ate of the green, mouldy mass until I forbade it."

I learned later, that every particle of it was eaten, as that discarded before had been, by some of the party, whose ravenous sense of hunger was too strong to enable them to follow the dictates of their better judgment.

Lieutenant Lockwood, on that date, said: "To-night we have mutton and two cans of salmon for supper—about a third of what would be necessary to satisfy the appetite. This constant hunger is a miserable feeling, and goes not a little way to make our circumstances more dismal. Still the party all remain in good spirits. I dread next month, however, when we commence a still further reduction. How often my thoughts wander homeward to the dear ones there! I went along to-day to help to drag back the sledge, my knee being better."

"October 28th.—The temperature fell to −17.5° (−27.5° C.) last night. The sledge party sent to Sabine, with orders to break up the whaleboat and bring her in for fuel, were gone nearly eight hours. The sledge broke down three miles from camp, and the party came in without the load. The day was a very bad one, and a cold, strong, northerly wind, with heavy snow and the darkness, made travelling very difficult and fatiguing. Fortunately, the only thing now to be hauled in is a portion of the whaleboat still at Sabine. The difficulty of travelling over the rough, hummocky ice at present is hardly to be understood by any one who has not experienced work of this kind. The sun left us a few days since, which necessarily adds to our discomfort and depression. The hunters are out daily for game, but have found none, and to-day the violent storm drove them all in."

Lieutenant Lockwood says: "This is miserable; we have insufficient supplies of everything. Even the blubber will support but one poor light, and that hardly for the winter. We must rely on the whaleboat and the barrel-staves mostly for fuel, the alcohol being almost exhausted. Cold, dampness, darkness, and hunger are our portion every day and all day. Here in the hut one has to grope around in the darkness to find anything laid down."

"October 29th.—Elison fixed the sledge in the morning. The interior of the house has been graded with gravel and sand, so that most of the rocks under us are covered, and the sleeping arrangements have finally been completed. Two mattresses have been found, which will add somewhat to our comfort. By unanimous consent one mattress was set aside for me, and I directed that the other be disposed of by lot. It fell to Lieutenant Lockwood and Dr. Pavy, who have taken it. I turned over my mattress to Sergeant Gardiner, who for the past month has

occupied my dog-skin sleeping-bag, until his condition improves. The blankets, buffalo coats, etc., have been nearly equitably distributed, the sick receiving rather more than others. The hunters were out to-day, but obtained nothing, and Long was unfortunate enough to break through the young ice, and returned completely wet. Henry reports his foot frosted yesterday, but the doctor says the injury is slight."

An extract from Lieutenant Lockwood's diary shows the effect which hunger had already produced upon the party. It should be borne in mind that this experience occurred before the reduction of food to our regular winter ration. He says: "Occupied some time this morning in scraping, like a dog, in the place where the moulded dog-biscuits were emptied. Found a few crumbs of small pieces, and ate mould and all. We now get about one-fourth what we could eat at a meal, and this little ration is to be much farther reduced as soon as the sledging is done."

"October 30th.—Sent twelve men for the whaleboat, who were gone nearly seven hours, and issued to them two ounces of extra pemmican; as well as to Elison, who is working on a Hudson Bay sledge for the trip to Isabella. The sledge party had a hard trip, owing to the rough ice, the high tide, darkness, and a strong westerly wind. Rum was issued for the last time daily; hereafter it is to be issued regularly on Sundays and to working parties. I sent Long and the Eskimos to Rice Strait for a few days' hunting, giving them, as a daily ration, eight ounces each of meat and bread, one-fourth gill of rum, one ounce of potatoes, and four ounces of alcohol for fuel—an inadequate amount of food for men undergoing such great hardships, but I can grant no more. Bender was fortunate enough to kill a blue fox with his fist; it was caught with its head in a meat-can. Schneider and Connell unwell, Henry and my-

self suffering from frozen feet, and Gardiner from a felon on his hand. Israel is suffering excessively from our unaccustomed privations, but he refrains from any utterances in the nature of complaints."

"October 31st.—A fox around camp this morning, but it was too dark to shoot him. Sent a sledge party, in a temperature of 2° (—16.7° C.), for the load which was abandoned three miles from the hut a couple of days since. They were gone about five hours. Dr. Pavy to-day objected strongly to the ration fixed by me which commences to-morrow. He says that we cannot possibly live on it. It is very trying to have the opinion of my medical officer put so strongly before me at a time when I must depend upon my own judgment alone, as the responsibility rests solely upon me. Most of the party concurred either in my views or in their willingness to be satisfied with my decision in the matter. While this should ordinarily be expected from a party under military discipline, yet, under the present circumstances, where moral influences alone have sway, and where so great hardships and privations have already been experienced, I cannot but be gratified by this general expression of confidence in my judgment and discretion."

Lieutenant Lockwood says: "To-morrow our reduction of ration commences. Whether we can live on such a driblet of food remains to be seen. We are now constantly hungry, and the constant talk is of dishes of all kinds, and what we have eaten and what we hope to eat when we reach civilization. I have a constant longing for food; anything to fill me up. God, what a life! A few crumbs of hard bread taste delicious. One imagines one thing, and another another. I spend much time in thinking of bills of fare. The hunting party have a slight increase of ration during their absence. I hope to God they have got something. How often my thoughts wander home!

I recall my dear father and mother, and the family generally. Then come the familiar family dishes of all kinds. Numbed fingers and want of light; I can write no more. No more sledging, excepting Rice's trip, until the spring, should we live to see it."

Our rations were now collected, and it remained to be seen if we could supplement them by our own exertions sufficiently to eke out an existence until spring and help should come. I had, however, decided on the necessity of a journey to obtain from Cape Isabella, forty miles to the southward, the one hundred and forty-four pounds of beef cached there by Nares in 1875. It would give nearly an ounce of meat to each daily, which, in the coming winter, might mean life or death.

This was the only cache on the entire western coast not already taken up by us, with the exception of the small cache of one hundred and twenty two pounds hard bread, left at Cape Cracroft, near Fort Conger, when we had all the provisions we could carry.

CHAPTER XLIII.

THE TRIP TO ISABELLA.

THE account of the journey to Cape Isabella, to obtain one hundred and forty-four pounds of English meat, is drawn largely from the relations of Frederick, a participant, and of Brainard, the advance guard of the rescuers.

The party, consisting of Rice, Frederick, Elison, and Lynn, left in a temperature of $-9°$ ($-22.8°$ C.) on November 2d, with a light sledge, a four-man sleeping-bag, a tent fly, rifle, cooking-lamp, and pot. They had a ration of eight ounces each of bread and meat, and five ounces of fuel alcohol. Rice was selected for the command, from his familiarity with the route to be travelled over. As the Arctic night had commenced a week before, darkness drove them to their bags on the ice, in Rice Strait, the first day out; but on the second they reached, tired and hungry, Eskimo Point, where they camped in our old quarters. The third day rough ice impeded their progress, and exhausted Lynn and Elison so that they camped before Cape Isabella was reached. On this day Elison and Lynn, in their great thirst, resorted, despite warnings, to eating snow, which proved so fatal to the former.

On November 7th, taking only their sledge, they found the ice so bad that they were seven hours in reaching Isabella and ascending to its summit. "The sky was clear, the moon bright, and to the southward," says Frederick; "we saw open water as far as the eye could reach. Waves, with white caps, came roll-

ing in to the very cape itself. Even at this season a vessel could have navigated without difficulty. Could we have embarked at this point, I have no doubt but we all would have reached our homes in safety."

They took up the cache of meat and started immediately on their return, but the rough ice-foot on the north of Isabella, in Baird Inlet, was so difficult to travel over that it was fourteen hours before the exhausted party reached their sleeping-bags. Rice had expected to make the trip in a few hours, and the day's work had been done on a cup of tea and no food. On reaching their camp, Frederick says, "Elison had frozen both his hands and feet, and our sleeping-bag was no more nor less than a sheet of ice. I placed one of Elison's hands between my thighs and Rice took the other, and in this way we drew the frost from his poor frozen limbs. The poor fellow cried all night from pain. This was one of the worst nights I ever spent in the Arctic."

Warm food refreshed them somewhat the morning of the 8th, but Elison again frosted his sensitive limbs, and Frederick continues: "It became unsafe to let him travel behind the sledge alone, and I took the poor fellow on my arm, and had almost to carry him, for his legs became as stiff as cord-wood, and he was unable to handle them. This is the closest I have ever been hitched in my life. If there is anything that will try the mettle of men, it is to put them in deep, soft snow and hummocky ice, with a 'rue-raddie' over their shoulders; but, nevertheless, we stood it like men, and I never heard a murmur of discontent." *

Elison was altogether helpless on the morning of the 9th, and

* It is worthy of remark that, though these men were doing their work on only sixteen ounces of food, and the temperature was from −20° to −25° (−29° to −32° C.), Frederick makes no special mention of their sufferings from cold and hunger. Such was the stamp of this man.

so, to save his life, it became necessary not only to abandon the meat, for which they had labored and suffered, but also a rifle, which was stood up to mark the spot. Ten hours' struggle, with a helpless, frozen man, brought them to our abandoned winter quarters at Eskimo Point.

To thaw out Elison's limbs, and dry his clothing, "which was a perfect sheet of ice," they were obliged to cut up the English ice-boat that had been left intact for a possible journey southward. "When the poor fellow's face, feet, and hands commenced to thaw from the artificial heat," says Frederick, "his sufferings were such that it was enough to bring the strongest to tears." Rice and Frederick on this day labored nineteen hours for the welfare of their comrades.

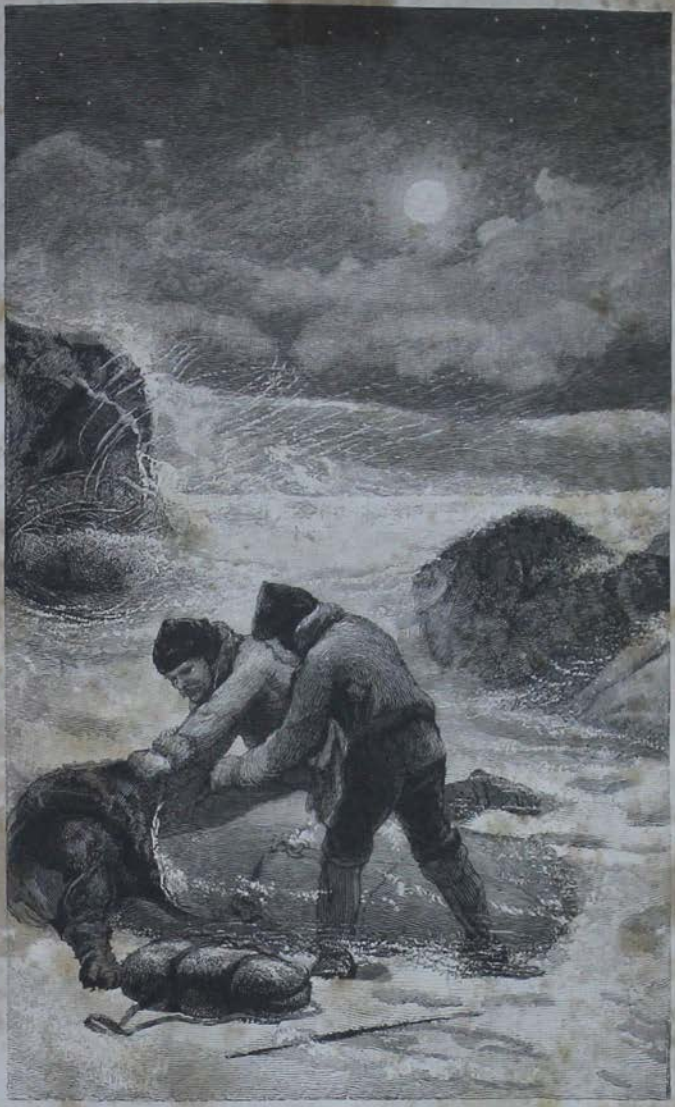
On November 10th they started for Camp Clay, Lynn going ahead with Elison, while the others dragged the sledge. The low temperature, about $-25°$ ($-32°$ C.), soon froze Elison's limbs and face, and glued together his eyelids. Frederick says: "We tried to keep Elison in front of us, but to no avail. He would stagger off to one side, and it seemed every moment that the frost was striking deeper into the poor man's flesh. We fastened a rope to his arm and the sledge, as it now took three men to haul our load, but every few rods the poor fellow would fall, and then sometimes he was dragged several feet. No person can imagine how that poor man suffered."

They finally reached the hill or divide between Baird Inlet and Rosse Bay, but were unable to haul Elison up the hill, and his feet were frozen so solidly that he could not stand. In consequence they were obliged to camp. A northward gale, with a temperature of $-22°$ ($-30°$ C.), prevailed, so that Rice and Frederick froze their fingers in an unsuccessful attempt to kindle a fire, while the sleeping-bag was laid in the only possible place, exposed to the full fury of the gale. They decided that Rice

should start for Camp Clay to obtain assistance, and he at once left, eating some frozen beef on the way. How he made the fifteen long miles he hardly knew, but through Rice Strait he travelled in the darkness, across ice newly formed, which cracked and bent as he passed. As he reached Buchanan Strait the moon fortunately shone forth, and, a broken, exhausted man, his staggering footsteps awakened me at midnight, and inspired me with new horror before his frozen lips could separate to say, "Elison is dying in Rosse Bay!" in answer to my anxious "Who's there?" He had travelled twenty-five miles and labored sixteen hours to bring us this dreadful intelligence.

In gloom and depression we heard the story, and counselled as to the rescue. I sent Brainard and Christiansen, at 4.30 A.M., in a temperature of −28° (−33.3° C.), with brandy and food, to relieve the immediate necessity of the party, and two hours later Lieutenant Lockwood, Dr. Payy, and the four strongest men (Jewell, Ellis, Schneider, and Jens) followed, with our large sledge.

Of the night passed by the men, Frederick says: "We tried to keep him (Elison) warm, but as we laid helpless and shivering with the cold, and poor Elison groaning with hunger (his frozen lips did not permit him to gnaw the frozen meat) and pain, you can imagine how we felt. Lynn was a strong, able-bodied man, but the mental strain caused by Elison's sufferings made him weak and helpless. In fact, I was afraid that his mind would be impaired at one time. We were but a few hours in the bag when it became frozen so hard that we could not turn over, and we had to lay in one position eighteen hours; until, to our great relief, we heard Brainard's cheering voice at our side. There was nothing more welcome than the presence of that noble man, who had come in advance with brandy for Elison and food for all."



BRAINARD AND CHRISTIANSEN SUCCORING ELISON, LYNN, AND FREDERICK.

A few hours later Lieutenant Lockwood came, and Frederick continues: "It was a godsend to be released from our prison. It was impossible for them to get us out of the bag the same way we got in, so it became necessary to cut the top of the bag off to relieve us. We were unable to stand alone, and our clothing was as stiff as boards."

Sergeant Joseph Elison.

Frederick and Lynn were sent in alone to Camp Clay, which they reached safely, although Frederick broke through the young ice at one place.

Lieutenant Lockwood arrived at 2 A.M., with Elison alive, but in a very critical condition.

Not only were Elison's hands and feet frozen solid, but his face was frozen to such an extent that there was but little semblance of humanity in the poor fellow, as he was dragged

through the narrow door of our wretched hut that November night. He begged piteously for death the first week, but within a month was a bright and cheery member of our party, despite his utter helplessness and great pain.

This journey of Lieutenant Lockwood and his party is, I think, the most remarkable in the annals of Arctic sledging. The half-starved, enfeebled party of eight men made a journey of nearly forty miles in forty-four hours. They travelled in darkness over very rough and heavy ice, exposed to temperatures ranging from —19° to —34.5° (—28.3° to —36.9° C.), and without mishap or disaster. They had been on reduced rations for over two months, and, although unfit for the most ordinary service, ventured their lives most cheerfully on the mere possibility of rescuing a comrade whom they expected to find dead. Except Brainard and Frederick, both rescuers and rescued perished piteously, notwithstanding the most determined struggle for existence. Certainly the men of the Lady Franklin Bay Expedition merited, by their courage, endurance, and helpfulness, a better fate.

The open water extending southward from Cape Isabella raised at once the question as to what would be done for our relief, and much discussion ensued among us.

It is perhaps best here to break that silence maintained by me for the many months since my return, through the long and bitter discussions regarding the responsibility for our great disaster, but I intend to weary no one with a lengthy and uninteresting argument.

There exists no doubt that in 1881 I should have done more than arrange for a retreat to Cape Sabine if we should not be reached at Conger. Although not under orders to do so, I should have provided against shipwreck and all other mischances. There is no doubt either, that General Hazen re-

grets that Memorandum No. 4 of his orders was not allowed to stand, as being in the direction of greater safety for all.

The neglect of these points would have been uncriticised, had the Proteus disaster not occurred. As to the responsibility for that disaster, others are better qualified than I to speak.

Similarly, the neglect of Lieutenant Garlington to replenish the stores he knew to be damaged, although he was under orders to do so, would have been unnoticed. I am already on record as pointing out the disastrous effect of such disobedience.

His action in taking every ounce of food he could carry when turning southward cannot be justified, nor his retaining and feeding a large dog under such circumstances. He acknowledged the dangerous condition in which we were situated, promised all assistance in the power of man, tied us down to Sabine, and, as events have proved, never even asked a national ship to turn its prow northward to our rescue or relief. Within thirty miles of twenty days' rations for his party, and a hundred miles from six months' supplies, which it was obvious could not be reached by me later in the season, he loaded his boats to the danger-line, even carrying food in tow, to insure the safety of his men. Others may justify this extreme prudence for his own party, but I can hardly be expected to.

The action of Commander Wildes in separating from the vessel he was to aid in this very emergency, his long delay at the Greenland ports, and his precipitate retreat southward from Smith Sound, have never been satisfactorily explained to his department. He knew that twenty-five of his countrymen counted on aid and relief that year, but his orders did not require him to assist them; so no misgivings as to their fate disturbed him, and his ship went southward still freighted with abundant and undiminished stores.

The Proteus disaster, and the subsequent failure of Com-

mander Wildes to extend relief, did not alone determine the fate of the party. I have already officially concurred in the views of Chief Engineer Melville, and the opinions of the sealers of Newfoundland, that our relief was practicable during the autumn of 1883. I can understand the unwiilingness of the Secretaries of War and of the Navy to send again northward the officers who had just failed us in Smith Sound, but not even this reason seems sufficiently urgent to justify the final adverse decision. I doubt not that the late Secretary of the Navy coincides in my opinion on this subject. The attempt of ex-Secretary Lincoln to defend his joint action in this matter must fall to the ground before the stern array of facts in the case. Had a stout sealer—and there were many available—left St. John, under a competent officer, within ten days after the return of the Yantic, the entire Lady Franklin Bay Expedition, in my opinion, would have safely returned.

In 1852 the tiny Isabel remained within the Arctic Circle, searching for Sir John Franklin, until October 4th; and for the relief of the Polaris party the steamer Tigress sailed a second time, under an officer of the navy, from the port of St. John, on September 17, 1872, five days later in the year than the return of the Yantic. All Arctic work is dangerous; and it was a question of risking much and spending little to bring the party back safely that autumn, or venturing less and spending lavishly to return the dead the following year. Prudent counsels prevailed, however; and, as the public said, the party was left to its fate.

CHAPTER XLIV.

WINTER QUARTERS.

THE first days of November gave us a realizing sense of the horrors and miseries to be expected from a sunless winter of nearly four months' duration under existing conditions. Nearly half of the party were unfit for duty, by reason of frost-bite or injuries received during our arduous autumn work. Our sleeping-bags and clothing were already frozen to the ground, and their interiors were thawed only by the heat of our bodies, and froze solidly on quitting them. The roofs and walls speedily gathered frost and ice, as did every other article in our wretched hut. It appears better to me that the story of our life that terrible winter should be set forth in the language of our journals, and should not be elaborated now in the comforts of civilization. While cleaving to stern facts, I have occasionally modified the sharpness of my comments. The reader is asked to bear in mind that the entries quoted were written by men patient in hardships, and always inclined to underrate, as a matter of pride, their great discomforts.

"November 1st.—We have on hand at this date the following stores: Lemons, 150; pemmican, 228 lbs.; bacon, 232 lbs.; beef, 410 lbs.; seal, 115 lbs.; potatoes, 76 lbs.; butter, 93 lbs.; lard, 50 lbs.; rice, 18 lbs.; raisins, 40 lbs.; tea, 73 lbs.; extract of coffee, 82 lbs.; extract of chocolate, 76 lbs.; onion-pickles, 10 gals.; milk, 38 lbs.; sugar, 15 lbs.; salt, 2 lbs.; onion-powder, 2 lbs.; pepper, 12 ozs.; bread, 1,395 lbs.;

dog-biscuit, 152 lbs.; extract of beef, 34 cans; soup, 48 cans; tomatoes, 24 cans; corn, 24 cans; peas, 27 cans; carrots, 13 cans; cloudberries, 46 cans; seal-blubber, 200 lbs.*

"The quantity of bread is uncertain, being partly estimated. The dog-biscuits, English bread, English chocolate, and some other small stores are in bad condition, but must of necessity be eaten. . We commenced to-day on a ration declared by the doctor to be insufficient for the support of life, but which has been adopted by me, after mature deliberation, as being our only chance of safety.

"It is as follows: Meat, 4 ozs.; extract of beef, 0.26 oz.; evaporated potatoes, 0.4 oz.; soup, 0.6 oz.; tomatoes, 0.3 oz.; peas, 0.2 oz.; corn, 0.2 oz.; carrots, 0.1 oz.; bread, 6 ozs.; dog-biscuits, 0.8 oz.; butter, 0.5 oz.; lard, 0.26 oz.; rice, 0.1 oz.; raisins, 0.16 oz.; tea, 0.3 oz.; extract of coffee, 0.44 oz.; extract of chocolate, 0.3 oz.; pickled onions, 0.4 oz.; milk, 0.2 oz.; and mulberries, 0.2 oz.

"Lieutenant Kislingbury is suffering very much, and fainted twice this evening, from his injury received while sledging, which the doctor reports to be rupture. Schneider killed a white fox weighing five and a quarter pounds, all of which, except the skin, is to be eaten. It is a great disappointment to find that the English potatoes cached in Payer Harbor are mouldy and almost uneatable.† They are packed, however, in paper, which accounts for the deterioration. Bender has made a stove from the sheet-iron with which the whaleboat was sheathed. It is a truncated cone in shape, and answers its pur-

* We later obtained 150 lbs. of seal-meat, 325 lbs. of bear, about 90 lbs. foxes, about 75 lbs. of dovekies and ptarmigan, 1,155 lbs. shrimps, 83 lbs. seaweed, and considerable quantities of reindeer-moss, saxifrage, and lichens.

† The barrel of beef, *badly secured*, left by Lieutenant Garlington at Cape Sabine, was never seen by us, nor the bacon said to be left in the wreck cache.

pose admirably. The barrels in which the food was cached, a small quantity of birch-wood, and the broken-up whaleboat is the scanty fuel, which supplements the English stearine and our own alcohol. In order to insure perfect combustion, and to derive the greatest heat from the fuel, the wood is cut up into pieces not much longer than matches."

"November 2d.—The doctor informs me that Lieutenant Kislingbury's rupture, from which he has suffered very much, is very serious, and may prove fatal. Ralston killed a white fox weighing four and a half pounds, and Brainard shot a blue one weighing three pounds. Our first meal cooked with wood in stoves made by Bender was eaten to-night. The stoves work very well; and, in order to economize fuel, I determined that the cooking should be done hereafter on one stove. There was a great deal of adverse criticism in regard to this decision, as, the party being divided into two messes, it will be necessary for one mess to wait until the cooking for the other is done. This is certainly trying to hungry men, but fuel is very scarce, and must be utilized to the utmost extent. Brainard discovered that a quarter of the English tobacco from Payer Harbor cache is missing. We were unable to determine whether it was never packed, or if it has been taken by some one. The former I prefer believing at present."

"November 3d.—Long came from Rice Strait for further rations. He brought me the joyful news that he has killed an harbor-seal, which he thinks will weigh one hundred and fifty pounds gross. The foxes have been very troublesome at Rice Strait; no matter what precautions are taken, the foxes manage to make their way into the tent and levy contribution on the meat there. Lieutenant Kislingbury is fortunately better. Colorless auroral streamers were visible from 3 P.M. until after 7 P.M., the curtain formation showing at times, and the au-

roral light was seen in all quarters except the north. Sergeant Israel observed Vega to-night. The temperature sank to —13° (—25° C.). Fresh bear-tracks were seen by Long near Cocked Hat Island, the animal coming from and returning toward Bache Island. The hunters have hopes of Master Bruin some day. The men are hopeful and cheerful, bearing well the cold, and short rations, and entire absence of light in the hut, except such as is afforded by the bit of rag dipped in seal-oil."

"November 4th.—Long left this morning, taking provisions to include Thursday. Brainard reports that the temporary commissary storehouse was entered last night. He suspects one of the party, who has been known to eat hard bread in his sleeping-bag. I am pushing work on the storehouse to avoid such dangers in the future. I decided to dispose of the foxes that we may kill as follows: They are to be issued as extra meat; the first fox being for the present week, the second fox for the last week in February, the third for next week, the fourth for the third week in February, etc. Under this rule, we ate to-day the fox killed by Bender, weighing three and three-fourths pounds. It is the first fox ever tasted by me, or, indeed, by any of the men, except, perhaps, the Eskimos. We pronounced it extraordinarily good, seasoned as it is with ravenous hunger. We are troubled much by smoke from the stoves. Issued a pound of blubber extra to-day for food, and another pound for light. Reading in the evening as usual, including the Psalms for to-day. The temperature down to —25.7° (—32.1°C.); terribly cold for our hunters and the unprotected travellers in Baird Inlet. With the rum, this evening, I issued a quarter of a lemon, which we unanimously declared to be the most delicious fruit ever tasted."

"November 5th.—Commissary-house finished, but not covered. A chimney was inserted in the bottom of the boat,

which forms part of the roof of our house. It was made from several tomato-cans, and affords great relief from the intolerable smoke. The doctor reports that Henry's foot was frozen more badly than he had thought. I have ordered that the mouldy bread, rotten biscuit, and other damaged stores be issued now, while our systems will best assimilate them, so that the best and strongest food shall come later, and so be an increase in nutrition though not in quantity."

"November 6th.—The stores were moved into the commissary-house to-day, and I feel somewhat relieved, although I cannot consider them safe until a frame and door, with lock and key, which we fortunately have, are arranged. Brainard overhauled the English sugar and tea; of the former but a few pounds remain, and the latter is quite worthless. If those articles only had been replaced, what comfort to us!"

"November 7th.—Strong westerly wind in the morning, with the temperature down to −20.3° (−29.1° C.). It sent down the temperature of our hut very much, and must be almost unendurable for the Isabella party. I cannot sleep much for thinking of them. Christiansen came in from Rice Strait, and reports that Long wants a sledge to-morrow to bring in his meat and camp equipage. Unfortunately they have not been able to kill anything since last week. Brainard's report that the seal-blubber overruns some ninety pounds, by his improvised scales, encourages the party greatly. I am doubtful as to the accuracy of the scales, but maintain silence, knowing Brainard's integrity and impartiality; and realizing, too, the importance of adding or seeming to add a half ounce of blubber to our ration."

"November 8th.—The temperature still falling, being at −31.5° (−35.3° C.) this morning. It was necessary, however, to send Lieutenant Lockwood, Dr. Pavy, Brainard, and five others to Rice Strait to bring in Long's equipage and meat. On their

return I issued an allowance of rum to them. Private Schneider, owing to Brainard's exhausted condition, being charged with portioning out the rum, took for himself a quantity without authority, and was visibly affected by it. He left the hut while the supper was cooking—he being the cook—and, not returning at once, search was made for him, and he was detected coming out of the commissary storehouse. The general sentiment is that Schneider has been implicated in the thefts which have been made therefrom. I am in doubt as to whether he entered the storehouse in a responsible condition mentally, but his taking the liquor is as bad as the food. I issued an order forbidding any one from entering the storehouse except the issuing sergeant, and took Schneider to task most severely for his misconduct."

"November 9th.—Lieutenant Lockwood discovered an opened but full can of milk hidden away. It had evidently been concealed by some one, who, surprised, had been unable to eat it after opening."

It appeared from the marks that the can was opened by a knife broken in a peculiar manner. It was afterward ascertained that the knife belonged to Henry, but he claimed to have lent it to Schneider.

"November 13th.*—The minimum temperature last night was —34° (—36.7° C.). Elison's condition is much better than could have been reasonably hoped for. Dr. Pavy thinks it barely possible that amputation may not be necessary. Bierderbick shot a white fox to-day, which weighed five and a half pounds. Bierderbick is devoting himself particularly to the care of Elison. He spends sixteen hours daily watching him and changing his bandages. Dr. Pavy, who has moved to the

* As the dates from the 9th to the 13th are included in the previous chapter, they do not occur here.

side of Elison to facilitate his attention, cares for the sick man the remainder of the day. I have given him (Elison) my mattress, which has been used to this time by Gardiner."

"November 14th.—Elison very bad all day; he suffers excruciating pain in his hands and feet. The men are slowly recovering from their exhaustion on the late severe trip."

"November 16th.—Strong wind last night; tide to-day the highest yet known; high water at 12.05 P.M. (Washington mean time)."

"November 17th.—The canvas roof was put on the vestibule to-day, which substantially finishes out-door work. I have been able to do but little of this. The men have shown an excellent spirit in this respect. Some of them have requested that I should do no work at all, thinking that my mental responsibility, as commander, is enough for me at this time. I, however, have done, as far as my physical condition would permit, the same manual labor as the others. My feet, which have been badly cracked from frost-bite, have prevented me from exposing myself without there should be some pressing demand.

"I have been casting about for some means to amuse and divert the party during the weary time now upon us. The entire work of the party does not require more than an hour's labor from two or three, and the remainder, by choice or necessity, remain almost continually in the sleeping-bags. As we have fairly entered upon an Arctic night of nearly four months' duration, it is an absolute necessity that the spirits of the men should not be allowed to flag.

"After much thought and some consultation, I have decided to give, daily, a lecture, of from one to two hours in length, upon the physical geography and the resources of the United States in general; followed later by similar talks on each State

and Territory in particular. I commence to-day by talking on the physical geography of the United States, particularly with reference to its mountain and river systems. Lieutenant Kislingbury is much better of his rupture. He has suffered a great deal of pain from it, and once fainted under the doctor's hands."

"November 18th.—I talked for an hour or more to-day, regarding the peculiarities of climate and the various products, etc., of the United States. In the evening I read the Psalms for the day. Rum was issued, except to those who drew in advance on their return from their last trip to Long Point. There was some dissatisfaction among those who had drawn in advance, and I mentally resolved I would not permit advance rations to be again issued, except in extreme cases. I received no rum, having given my allowance, a couple of days since, to the nurses on watch over Elison. Brainard to-day put up a signal pole on the adjoining cliffs, which should be seen by any party travelling along the coast. I have not the faintest expectation of such a party this winter, but some of the rest have, and I am unwilling to depress their spirits by destroying any hopes they may nourish."

"November 19th.—Long shot a blue fox weighing four and a quarter pounds; Jens shot one weighing three and seven-eighths, which has much encouraged us. The entrails of the foxes killed go alternately to the messes, being used as an addition to, or flavor for, the stew. Talked for an hour or two on the grain and fruit products of the United States. Last evening there was reading from 'Pickwick,' by Jewell; 'Two on a Tower,' by Rice; 'A History of Our Own Times,' first by Lieutenant Lockwood, and later by Henry." *

* These books, with the exception of Two on a Tower, which was found in the wreck cache, were taken from Conger.

"November 20th.—I have been obliged to order reduction of meat and bread a fraction of an ounce, so that hereafter we have four ounces of meat daily and six ounces of bread. This reduction has been made necessary to provide extra rations for Elison. The doctor urged a very large increase, but I finally compromised the matter by giving him four ounces extra of bread and four ounces of meat. It seems to me that this, together with the extract of beef in the medical department, should be sufficient. The reduction was, of course, made on my own responsibility, but it was exceedingly gratifying to note that no one in the party in any way expressed his dissent from or dissatisfaction with my action. I believe the feeling to be general that the party realize that Elison's helpless condition has arisen from a spirit of self-sacrifice on his part in our behalf, and that in consequence we should be willing to deny ourselves, each a little, in his interest."

"November 21st.—Elison has improved a great deal, and the doctor thinks that he will recover without an operation. On the doctor's representations, I have set aside all the lard (fifty pounds) for medical purposes. I hardly think it can all be necessary for Elison's wounds, but I am glad to indorse anything which seems to show forethought for the future. The reduction of lard and meat will be in a slight degree replaced by an inconsiderable amount of seal-blubber, which can be spared from our stock of oil. I gave an hour to the mineral productions of the United States. It was interesting to note the lack of interest shown by the party regarding the production of gold and silver. Several have spoken on the subject of money, and there are but few men who would not willingly sacrifice their entire pecuniary fortunes, if by so doing they could guarantee the successful return of the expedition to the United States."

"November 22d.—Long shot a blue fox weighing three and one-half pounds, and later Christiansen shot another, also blue, which weighed the same as Long's. I gave another hour to the United States in general; treating particularly of its geographical subdivisions, as I intend commencing on the States in detail to-morrow."

"November 23d.—Talked for nearly two hours to-day on the State of Maine, touching on its climate, its vegetable and mineral products, its river system, mountain ranges, principal cities, its most important resources and manufactures, its history, and the famous men who have come from the State; and also as to its inducements to emigrants to settle within its limits. The same line of discussion will be followed regarding the other States. Subsequently I called upon Jewell, who has lived in Maine, to supplement my statements by any additional information he might possess; and, later, invited questions from any of the party on mooted or neglected points."

"November 24th.—Talked for a couple of hours on New Hampshire; my remarks being supplemented by Jewell by an account of life on Mount Washington, which he contrasted very favorably with our present deplorable condition. Instead of the customary reading from the Bible, Dickens, and the Army Regulations, this evening was given up to reminiscences pertaining to the past lives and domestic surroundings of the men."

"November 25th.—Sunday celebrated as usual by a 'sun-of-a-gun' for breakfast. This dish consists of a mixture of hard bread, raisins, milk, and as much seal-blubber as can be properly spared for the purpose. Several of my mess united with me in contributing our lemon-peel, in order to give it a flavor, and with the hope that the entire party will do so hereafter. Christiansen shot a blue fox, which weighed four and one-

fourth ounces, and Long saw another, but too far distant to be fired at."

"November 26th.—The temperature was down almost to freezing mercury this morning, with a clear sky. Jens reports that there are dense water-clouds to the north, but that toward Greenland the sky is entirely clear. I infer from this that the straits are freezing over.

"Bender complained to-day of unfair treatment toward himself, as to the amount of bed-clothing assigned him; claiming that he did not receive his due proportion. Such an accusation is extremely annoying to the whole party, as everybody realizes the fact of Bender's having received a much larger share than he is entitled to. Every consideration has been shown him by me, owing to his delicate condition on leaving Conger. I sometime since stripped the blanket from my own bag, much to the annoyance of Sergeants Jewell and Israel, who are occupying it in common with me. The result of Bender's complaint was that part of a blanket was transferred to him by other parties, who needed it as much as he. In addition, he has been given, for his personal use, a buffalo overcoat found here at the wreck cache."

"November 27th.—The temperature was down to −43.5° (−41.9° C.) last night, and went down to nearly 20°(−6.7° C.) inside the hut. I talked for awhile on Vermont to-day."

"November 28th.—Strong wind and drifting snow, which makes our quarters much more uncomfortable than yesterday, although the outside temperature has risen to −11° (−23.9° C.). A fox was fired at, but unfortunately missed."

"November 29th.—The last Thursday in the month, and so set aside by me as a day of thanksgiving and praise, in order that we might act in accord with those we have left behind. The day has been looked forward to for weeks; and, with a view of properly celebrating it, six pounds of rice, five pounds

of raisins, two pounds each of extract of coffee and chocolate, and two pounds of milk were reserved from the general stock when an inventory was made. It seemed to me then that making this a great and happy day would so break in on our wretchedness and misery as to give us new courage and determination. I am convinced that the idea was a most wise one. To-day we have been *almost* happy, and had *almost* enough to eat.

"I doubt if any other men in the world have been more thankful for their health, strength, and comparative happiness than we. An extra half gill of rum and a few lemons, under skilful manipulation, gave us the most delicious punch we had ever tasted. Long's stories and merriment in general kept us all amused and cheerful until midnight. It seemed to me that the Psalms of the day made a deeper impression than I have ever before noted."

"November 30th.—A stormy day, with the temperature at 3° (−16.1° C.); the first time it has been observed above zero (−17.8° C.) this month. The month ends comparatively well, with Elison in much better condition than any one had hoped for. The party in general are in good health, although a number suffer much from constipation."

"December 1st.—An easterly storm of great violence set in, and made us very uncomfortable by drifting snow entering through the roof, and lowering the temperature within the hut. The evening was given up to personal reminiscences; and, when those failed, to discussing future prospects, which were looked on hopefully by most."

"December 2d.—The storm, which was exceedingly violent, continued until noon. It required several hours' work on the part of three men to clear out the entrance to the house, which had been entirely filled with snow. We find that the storm

INTERIOR OF OUR WINTER HUT AT CAMP CLAY, DURING COOKING, 1883.

unroofed the passage-way, blew away some of our wood and also the minimum thermometer. The cooks prepared breakfast under great difficulties. There was about eight inches of snow in the passage-way and on the bottoms of the sleeping-bags, which had to be cleared out as well as possible before anything could be done. Afterward the heat from the cooking-lamps melted the snow remaining, and in consequence the cooks were wet through by moisture from above and below."

"December 3d.—As much as possible of the wood was gathered up and brought within the house or the passage-way. Gave a couple of hours to-day to the State of New York."

"December 4th.—During last night some one, without doubt, took bread from Corporal Elison's bread-can. I was awake, and plainly heard it done."

In this entry of the most unfortunate experience of the month the name of Dr. Pavy was omitted. I was shocked that the surgeon of the expedition should so fail in his duty to the men and his commanding officer, and this discovery gave me great anxiety. Realizing that an open charge would result in a denial and bitter discussion, I committed my knowledge of this fact only to Lieutenant Lockwood, as my successor in command, and to Sergeant Brainard, who doled out the provisions. The importance of the doctor's services to us at that time was manifest to the entire party; nearly every one but myself had been treated medically since reaching Sabine, and the demand for medical treatment was constantly increasing. Whether right or wrong, I felt the necessity of pursuing conciliatory methods entirely.

"December 5th.—Another violent easterly gale set in last night, which changed to the west this morning, filling with snow the passage-way and commissary storehouse. The frequency of these late storms is trying to us, not only from the

physical discomforts experienced, but because the straits must necessarily remain open during the prevalence of such high winds. Our reading in the evening, which is apart from my lectures upon the various States, generally consists of a chapter or two from the Bible, by Gardiner; the Army Regulations, by myself; and a chapter of 'Pickwick,' by Jewell."

"December 6th.—Long shot a blue fox; weight three pounds. Gave an hour or more to Pennsylvania to-day. Reports from parties who have been on the hill indicate that the straits are open at present."

"December 7th.—A new water-hole was dug in the lake with great difficulty, as there were no proper tools for the work and the ice is nearly four feet thick."

"December 8th.—Brainard happily shot two blue foxes which together weighed seven and three-fourths pounds. Gardiner relieved me by talking an hour or more regarding Philadelphia. In cleaning out the snow from the vestibule the can of alcohol was unfortunately struck, and a small quantity (perhaps a pint) was lost. The careless man was soundly berated by the community at large."

"December 9th.—Two blue foxes were shot to-day, weighing over five pounds; one by Long and one by Brainard. The large number of foxes killed lately encourages us to hope that the supply may continue. One of the foxes shot was but half blue; all others have been distinctly blue or white, the blue species being invariably the smaller. Rice gave a glowing account of a year spent in one of the tropical islands of the Gulf of Mexico. The contrast to our present situation was so great that it added to the force of his graphic descriptions."

"December 10th.—A strong westerly gale, with drifting snow. Temperature, −27° (−32.8° C.). Dr. Pavy informs me that Elison's feet will be saved. Part of one hand must be

eventually lost, but no amputation will be made in our present camp. The patient is cheerful, talks much, and his face has healed to such an extent that he enjoys smoking."

"December 11th.—Bierderbick, who does not agree with the doctor, told Lieutenant Lockwood that Elison would lose his feet and part of his hands, as the line of demarcation is quite plain, being just below the ankle in the feet, and through the fingers of the hands.

"Brainard overworking himself again, and was faint and dizzy this evening. I was obliged to remonstrate with him for doing other work than issuing, as I have forbidden it; but when he points out the apathy of the party, and the necessity, I am silenced. Every one does the best he can, and I regret bitterly that I have only the ability to kill time, and am unable to do besides the hard physical labor."

"December 13th.—Trouble in Lieutenant Kislingbury's mess to-day; they accuse Frederick of unfairness in dividing the rations. Dr. Pavy, Henry, and Whisler stated they had plotted to catch Frederick dealing unfairly. At my request, Lieutenant Kislingbury listened to all the members of his mess had to say upon the subject. After hearing all the testimony, to which I also listened, Lieutenant Kislingbury decided that the complaints were unfounded, and he desired that Frederick should remain on duty as their cook. I concurred in Lieutenant Kislingbury's opinion; but, in order to prevent any recurrence of such a suspicion, directed that hereafter the bread should be brought in by Sergeant Brainard, that its division should be made openly in the presence of the party by Frederick into the mess-pans, and that these portions should be hereafter distributed to that mess by the different members in turn, it being understood that the cook should receive the one which was left. We have so far avoided following the

rule in the 'Investigator,' where the carver took the portion remaining after each man had helped himself. One bit of flame, affording about as much light as a poor tallow candle, suffices for the entire hut. The steam and smoke which are produced in cooking are so dense that but few of the party are able to even sit up in their bags while cooking is going on, and only on favorable occasions can a man see the face of his neighbor touching him. In the midst of these dense clouds of smoke and steam, without any additional light, the cooks are obliged to divide the stews, tea, and other food. I do not believe that either cook has intentionally shown partiality to any member of the mess, or retained an extra quantity for himself. The ravenous, irritable condition in which the entire party are at present cannot but have the effect of making most men morbid and suspicious. Sergeant Gardiner lately said to me that he objected very decidedly to passing Rice's ration to him, if it could be avoided. He declared that he realized the fairness of the cooks, but that, in allowing a cup of tea or a plate of stew to pass through his hands, he could not prevent himself from mentally weighing the food as it passed, by comparing it to the portion which came to himself. Such a comparison he knew was small and petty, but his starving condition must explain and excuse it. I readily understood his feelings, as I myself have avoided handing another man's portion for similar reasons.

"Discouraging weather—high winds, with a temperature of $-25°$ ($-31.7°$ C.), which makes our hut even colder than usual."

Looking back on those days, when an ounce of food was worth far more than its weight in gold, I wonder only that our two cooks, Long and Frederick, aggravated and excited by the odor of their dishes, came so blameless from the ordeal of a long winter night, where all eyes watched as far as possible their every motion and action.

CHAPTER XLV.

WINTER QUARTERS.—(*Continued.*)

"DECEMBER 14th.—Christiansen shot a white fox to-day, which weighs four and one half pounds, and gives us such a number that we have a fox extra each week until March. They have increased our food a third of an ounce daily. Lieutenant Kislingbury's mess in trouble again to-night regarding their soup, which was cold, some said, by the time they got it. This resulted from the new method of dividing the food, and it is noticeable that the men who complained and brought about the change in methods of serving are the men dissatisfied with the new arrangement.

"December 15th.—Trouble with water-hole again. Gardiner supplemented my remarks on North Carolina to-day by a very interesting account of plantation life in that State. Our police work is now done in rotation, one man each day being required to remove the slops, keep open the water-hole, and bring the water for the cooks. The exemptions from this duty, which requires from twenty to thirty minutes' work once a fortnight, are as follows: Myself, Dr. Pavy, Brainard, who has his hands full issuing rations; the cooks, Bierderbick, who is steward; Henry, whose toe is frost-bitten; and Israel, who, though well, is physically very weak; Gardiner's sore hand also excuses him; and Cross, in accordance with the doctor's advice, has been directed to saw the wood for the party, which

is done within doors, and thus prevents him from exposure to cold, to which he is very sensitive."

"December 18th.—My remarks to-day were on Florida; delightful by contrast, if for no other reason." Brainard's diary says at this date: "One phase of our life on a starvation diet is the unanimity with which every body reproaches himself for not having eaten more when he had an opportunity. No person appears to have ever disliked any dish of which he has partaken."

"December 19th.—A heavy storm to-day. Had a great deal of trouble in opening the water-hole; and, in default of volunteers, I assisted the regular water-carrier myself. The chisel was lost from the stick, but I managed to find it; and Brainard, coming to the rescue, struck water later. I am so weak that my work amounted to nothing except its stimulating and encouraging effects."

Lieutenant Lockwood says: "We are all very weak, and I feel an apathy and cloudiness impossible to shake off. It is a great difficulty to know each night just how much hard bread to save for breakfast on the morrow—hunger to-night fights hunger to-morrow morning. I always eat my bread regretfully. If I eat it before tea, I regret that I did not keep it; and if I wait until tea comes, and then eat it, I drink my tea hastily and do not get the satisfaction I otherwise would. What a miserable life, when a few crumbs of bread weigh so on one's mind! It seems to be so with all the rest. All sorts of expedients are tried to cheat one's stomach, but with about the same result."

"December 20th.—I talked on Alabama and Tennessee. I heard a fox several times last night running over the roof of the house, and sent Long out, but he never succeeded in getting sight of the animal. Christiansen happily shot a white fox which weighed four and a quarter pounds. There is great re-

joicing over the killing of a fox, not only for the prospective increase of food later, but because the entrails are immediately issued to a mess and are used to flavor that day's stew. The entrails weigh only a few ounces, but they change the taste, in imagination at least, much to our delight. Christiansen received with great joy the half ounce of tobacco which I give each Eskimo whenever he kills a fox or seal. In addition he received the heart and liver, which go to each hunter, white or native, as his perquisite. Dr. Pavy reports that the entire party are in an excellent state of health, and that their condition is wonderful considering the amount of food they have been living upon."

"December 21st.—Sergeant Brainard is twenty-seven to-day. I gave him half a gill of rum extra on that account, regretting my inability to do more for him. He has worked exceedingly hard for us this winter; and, while all have done their best, his great endurance, unusual equanimity of temper, and impartial justice in connection with the food have been of invaluable service to me. Brainard shot at a blue fox, which escaped, leaving blood upon the snow, but he followed with a lantern and discovered the animal dead some two hundred and fifty yards distant. Everybody shows a feeling of happiness that I have added a fox to our Christmas allowance, as this one was extra.

"The effect of moral influences is strongly shown by the condition of the party to-day. The fact that the sun is at its farthest from us, and must hereafter be returning, has caused a wonderful improvement in spirits. Lieutenant Lockwood exchanged places with Jewell in my sleeping-bag this afternoon, and I had a delightful conversation with him regarding the effect of the sun upon our spirits."

Lieutenant Lockwood says: "The top of the hill, the most glorious day of the dreary journey through this valley of cold

and hunger, has at last come, and now nearly gone. Thank God, now the glorious sun commences to return, and every day gets lighter and brings him nearer. It is an augury that we shall yet pull through all right. By a great effort I was able to save an ounce of bread and two ounces of butter for Christmas. I shall make a vigorous effort to abstain from eating it before then and have put it in charge of Bierderbick as an additional safeguard."

"December 22d.—A clear, calm day, which has been marked by nothing special, except the sight of a fox."

Brainard says: "Mouldy hard bread and two cans of soup make a dinner for twelve. At Fort Conger ten cans of soup were needed to *begin* dinner. But even the dire calamity which now confronts us is insufficient to repress the great flow of good nature in our party generally."

"December 23d.—Trouble again with the water-hole, which could not be opened by Connell, whose turn it was. Everybody but the cooks, the doctor, the steward, and the invalids were out working on the hole. Later, Brainard succeeded in getting water. Ellis worked long and faithfully on the hole, and on his return to the house fainted, from the effects of change of air from the extreme cold to the hut, and from his exhaustion by labor. Temperature, $-25°$ ($-31.7°$ C.). Salor thirty-three years old to-day; received a half gill of rum extra."

The discomfort of our faithful cooks, Frederick and Long, are only faintly set forth by Brainard, who says: "The poor cooks retired early this evening, both ill from constant inhaling of smoke from the damp burning wood. While the meals are being prepared, the hut is filled with a dense smoke which nearly suffocates us. All except the cooks can protect themselves by crawling down in their sleeping-bags, but they are

obliged to stand over the fire blowing it continually, and thus suffer such misery and discomfort as can scarcely be appreciated by others. . . . We are all more or less unreasonable, and I only wonder that we are not all insane. All, including myself, are sullen, and at times very surly. If we are not mad, it should be a matter of surprise. I wonder if we will survive the horrors of this ice-prison."

"December 24th.—Dr. Pavy was attacked by a nervous chill to-day, and was for a time in an alarming condition. I ordered some rum for him, and Bierderbick did everything in his power to alleviate his wretchedness, and was quite successful in the treatment."

"December 25th.—Christmas. Temperature, —34.8° (—37° C.). Lieutenant Kislingbury thirty-six years old. Our breakfast was a thin pea-soup, with seal-blubber and small quantity of preserved potatoes. That of the other mess was similar to it. Later two cans of cloudberries were served to each mess, and at half past one o'clock Long and Frederick commenced cooking dinner, which consisted of a seal stew, containing seal-blubber, preserved potatoes, and bread, flavored with pickled onions; then came a kind of rice pudding, with raisins, seal-blubber, and condensed milk. Afterward we had chocolate, followed later by a punch made of a gill of rum and a quarter of a lemon, to each man.

"The idea of scanting ourselves for a comfortable Christmas has borne good fruit, and is now heartily commended by all. There was a great deal of kindly feeling and good-will shown to-day, and a general desire was expressed to heal over any old wounds or uncharitable feeling. Late in the evening the records left by Lieutenant Garlington and Mr. Clay's letter were read. Everybody was required to sing a song or tell a story, and pleasant conversation, with the expression of kindly feel-

ings, was kept up until midnight. We had Danish, Eskimo, French, German, and English songs. One event of the evening was the reading of a birthday bill of fare, which had been made up by the party for future birthdays. The good feeling burst forth in cheers for myself, Elison, our crippled comrade; for the cooks, and for Rice, who goes to Littleton Island the earliest moment in February. Brainard replaced the broken distress flag-staff facing the Greenland coast, and enthusiastically predicted that Lieutenant Garlington would visit us during the full moon in January, an opinion shared by Pavy, Kislingbury, and others, which I cannot participate in, but am reluctant to discourage."

Brainard writes: "The spirits of the party are wonderfully joyous and exuberant. If they continue as at present, there is little danger of our losing our minds. What a contrast is ours to the Spitzbergen party of walrus-hunters, who perished owing to depression of spirits, although having an abundance of food!"

"December 26th.—Brainard shot a blue fox weighing three and a quarter pounds. Frederick's eyes are so much inflamed by smoke while cooking that Bender has temporarily relieved him."

"December 27th.—I talked an hour this morning on Kentucky, my remarks being supplemented by Jewell, who gave an interesting account of the manner in which horse-breeding is conducted in that State; Jewell, having made a specialty of the pedigree of horses, whiled away an hour or two for us very pleasantly. The temperature is very low, down to —40° (—40° C.)."

"December 28th.—To supplement our scanty fuel we are burning rope, which creates a dense smoke very irritating to our eyes and throats.

"Quite a discussion regarding a proposed experiment for cooking with blubber, which turns on using alcohol or blubber, for what is used of one is saved of the other. It is uncertain whether our fuel will hold out or not, and from present appearances the water-hole cannot be long kept open. Objections are made to using blubber for light even, except during cooking, but I believe mental occupation, such as reading, is worth much more than the blubber burned, even if the light does not do us physical good. The information we have picked up from the few books abandoned by Lieutenant Garlington and the discussions which have arisen from them have tended to keep us alive."

"December 31st.—A severe storm last night, which lasted into to-day, and was followed by another gale at noon. The water-hole froze up again, and we had great trouble in opening it, which made all gloomy; but the men were again in good spirits after water was obtained. There has been a good deal of trading of rations among the party to-day, based on the preference for one kind of meat or bread or particular article of food over another. I talked an hour to-day on Michigan, my remarks being supplemented by Israel. Cross' feet trouble him to such an extent that Bender and Schneider have been lately sawing the wood. Commenced melting ice to-day over the blubber-lamp to obtain water for dressing the wounds. I reproach myself that this has not been done before, as considerable alcohol could have been saved. I lay awake until midnight watching the Old Year out and the New Year in, wishing the party 'A Happy New Year' immediately after the stroke of midnight."

"January 1st.—Commenced the New Year under good auspices, as Connell thought he could see the Greenland coast, and the sound has apparently frozen over. Sergeant Cross and Lieu-

tenant Lockwood show signs of weakness, the first I have detected. I visited Lieutenant Lockwood, and fully advised him as to how matters went and what my opinions were on many subjects. I urged hopefulness on him, and am sure the visit did him good. The only thing extra for the New Year's Day were cloudberries and a fourth of a lemon and gill of rum to each man. Lieutenant Lockwood spilled his tea, which was made up to him by contributions from several of our mess. Brainard shot at a fox and missed him—the first time, I believe, this winter that he has missed any game. Temperature, −32° (−35.6° C.)."

"January 2d.—Owing to a defective cartridge, Connell missed a fox to-day. The doctor severed the fragment of skin which held Elison's right foot to his ankle unknown to the patient. Made the long-talked-of experiment with blubber to-day, using two pounds for that purpose, and found that it heated to the boiling-point two and one-half gallons of water, and leaves an eighth of its weight in tried blubber. With it the first pot boiled in forty minutes. We return for the present, however, to the use of wood as fuel, and I have ordered the remainder of the blubber to be used for food. A new water-hole was commenced to-day. Dr. Pavy began speaking French to me, saying that he found it easier to speak in that tongue than in English. Lieutenant Lockwood exchanged places with Jewell in my bag, and passed last night and to-day with me. I have talked very encouragingly to him, and he is in a better and more hopeful frame of mind."

"January 3d.—A brilliant aurora from 3.30 to 5 P.M. to-day. Brainard wounded a fox, but he escaped. Such incidents always depress a man. Dr. Pavy cut off one of Elison's fingers."

"January 4th.—Brainard reports that a hole has been cut through the canvas roof of the storehouse, and a small piece of bacon fished out. This bold attempt to steal our food gives me

great uneasiness for the future, but the general sentiment is still strong and hearty in favor of equitable division among the strong, and such consideration toward the feeble as is possible. Five foxes have been seen to-day, and a blue one shot by Brainard. Instead of the usual geography, I read an hour or more from a statistical book which Lieutenant Kislingbury brought from Conger."

"January 5th.—Trading, which at first had a good moral effect, is becoming harmful, and I am discouraging it as much as possible. Bender talked to us for an hour or more this evening regarding his tramps through Germany while an apprentice, and gave an interesting account of gambling life at Baden-Baden. Temperature, −35° (−37.2° C.)."

"January 6th.—Elison is doing very well, and the doctor now thinks he will live. I have been obliged to forbid wagers for food or drink, or the trading of provisions for either rum or tobacco. Happily but few have any inclination in either direction."

"January 7th.—Bierderbick talked this evening upon home life in Germany, and I discoursed an hour or more this forenoon regarding Minnesota, my remarks being supplemented by Kislingbury.

"Brainard discovered to-day that some one had made a hole with an axe in one of the barrels of bread, and had taken out several pounds. He suspects the thief, but has no direct proof. Quite a number offered an ounce of bread a day to keep the thief from temptation if he would only confess and repent. The guilty man kept his counsel, evidently distrusting the gift. It appears that some one in Lieutenant Kislingbury's mess has taken a piece of bacon from one of their pots, where it was put by their cook. Complaints have been made that in the darkness at night, after the Eskimo lamp is put out, some one has

been in the habit of scraping the rancid seal-oil out and eating it. Every effort has been made to discover who it is that has been guilty of these practices, but without results. Read half an hour this evening out of my diary for 1883, so that the party might know what was done a year or more since."

"January 8th.—I talked for a long time on Iowa this morning and also alluded to the fact of its being the anniversary of the battle of New Orleans. A storm set in this morning from the west. The extract of mutton issued to our mess turns out to be tainted; but, strange to say, it was relished very much, an indication that our taste is sadly blunted.

"Brainard has shown signs of weakness lately from overwork. I offered him an increase of an ounce of bread daily, but he declined to accept it, promising, however, that he would advise me whenever he felt that he could no longer perform his arduous services without it."

"January 10th.—I ordered every one to carry out instructions as to their health given any man by Dr. Pavy. In consequence Ralston and Ellis are to stop smoking tea-leaves, a solace I am loath to deprive them of, but which cannot be safely indulged. I have discountenanced the practice, but have not prohibited it in any other cases."

"January 11th.—The day a very fine one. Succeeded in getting Cross out for a little exercise. He has done no work lately, and the doctor says he has been too much in his sleeping-bag. Ellis somewhat better. Kansas dilated on by me to-day."

"January 12th.—Elison is thirty-four years old to-day. He is cheerful and doing wonderfully well, although both feet and the greater part of both hands are gone. I gave him a half gill of rum to celebrate the day. The doctor reports that Cross', Schneider's, Lynn's and Ellis' mouths are looking as though

they might have a touch of scurvy. In accordance with the doctor's recommendations, I forbade to-day the smoking by any one of tea or any other substance than tobacco. The strong wind which sprang up last night has continued to-day. Lieutenant Lockwood is worse, being very weak, and also suffering somewhat from diarrhœa.

"The water in the lake has gradually grown very salty; evidently the sea communicates freely with the lake, and the fresh water has all turned to ice. Fuel is scarce, and now the water for tea must be melted from the fresh ice. This announcement was a great blow to the party, but I have more than counteracted the effect of it by directing Brainard to permanently increase the bread ration half an ounce daily. Brainard's reports as to how the bread is running by his patent scales enables this increase to be made. The exact condition of our larder is reported to me weekly and privately, so as to avoid pressure for a change in our ration."

"January 13th.—Lieutenant Lockwood gave me much anxiety all night through, as at times he seemed to be decidedly out of his head. It appears that he has been saving up small amounts from each day's food; and, from his own account, he ate to-day twenty-four ounces of solid food; an imprudence which has tended to break him down. He sees everything double, and is very weak. He wanted rum frequently to-day, which I was unable to give him. His Sunday allowance was issued to him yesterday, in accordance with the doctor's advice. The doctor forbade his smoking even tobacco for the present."

"January 14th.—Lieutenant Lockwood exchanged places with Jewell, and slept in the bag with me last night. He was so weak this morning that I was obliged to assist him in turning over in the bag, as well as in sitting up for his breakfast. He feels the lack of smoking very much, and says it is a great depriva-

tion. Cross, the doctor tells me, has marked signs of scurvy. To-day he has shown mental weakness, and several times begged for rum. He is very badly off. In accordance with the doctor's advice, he was set to sawing wood again, as the doctor says exercise is absolutely necessary in his case. Ellis and Schneider are better. The doctor says, in his opinion, there are several of the party who cannot possibly cross Smith Sound in their present condition; a statement which may be true, but I refuse to believe it as yet.

"Ralston, Lynn, and Jewell were aroused for exercise with great difficulty. This constant inciting of others to energy weakens me greatly, being a steady strain on my strength. The increase of bread which I determined upon Saturday commenced to-day. It is but half an ounce, which is, however, a great deal to us. The lake-water which we are yet using in our stews is very salty, and causes much thirst in the party. Talked on Nebraska, my remarks being supplemented by Lieutenant Lockwood. We are burning boot-soles at present."

"January 15th.—Lieutenant Lockwood still in the bag with me, and I had a great deal of conversation with him to-day. He is somewhat better, and no longer sees double as he has been doing for the past two days. He admitted being very much depressed, and laments it as one of his characteristics. He acknowledged to me that the fear of open water cutting us off from crossing to Littleton Island this spring has given him great and constant anxiety the entire winter. In consequence of the necessity of melting ice hereafter for all our water, I was obliged to reduce the quantity of tea, so that hereafter we have but half allowance. It comes very hard upon many of the men. I am able to stand it myself, and have taken some pulverized ice in a rubber bag, which I have melted by the heat of my body to furnish drinking-water for others. The party

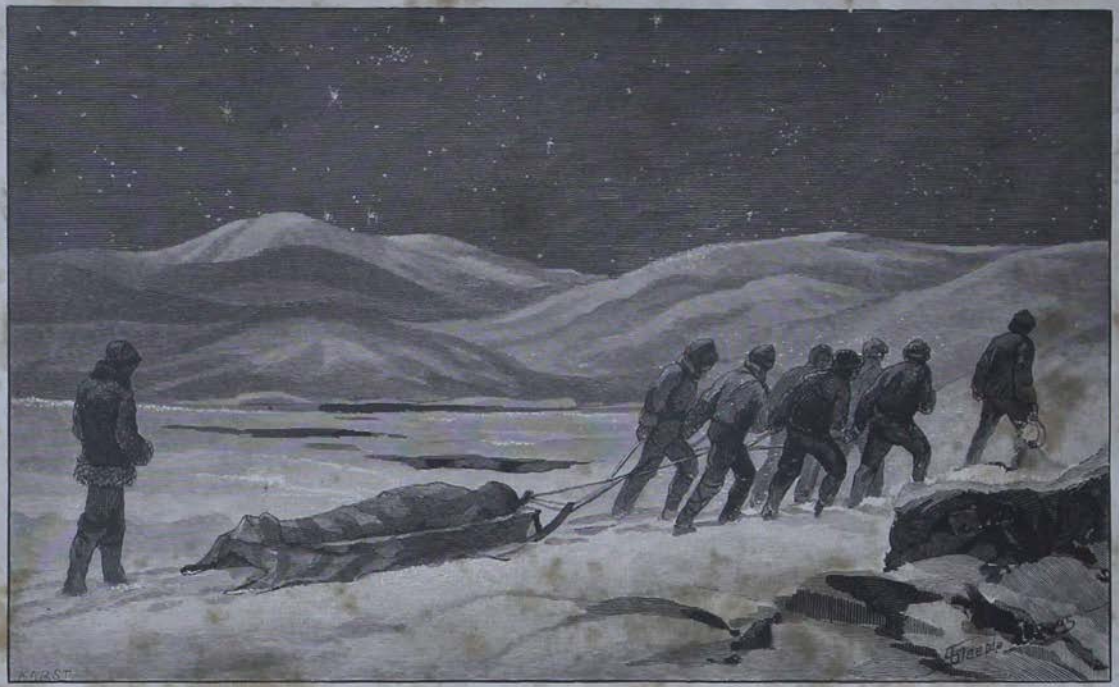
are somewhat depressed by the reduction of water. I talked for an hour upon the Indian Territory. Conversations of this character are not as popular as they have been, and they are exceedingly trying upon me, leaving me perfectly exhausted when I am through."

"January 16th.—Lieutenant Lockwood with me, and is somewhat stronger, but cannot get up without assistance. For the first time since our deprivation I heard him complain of the ravenous hunger which troubled him. In consequence I offered him this evening my ration of beef, four ounces, which, however, he declined, saying that he felt my need of it was as great as his own, and he must refuse. I might here add that Sergeant Israel has several times, when ill, been offered a small quantity of my rations, but always declined to receive it. The day has been very windy and uncomfortable. Cross is much weaker to-day, and was unable to walk. The doctor seems to think that Lieutenant Lockwood has improved somewhat, and has permitted him to smoke a pipeful of tobacco to-day."

"January 17th.—Lieutenant Lockwood still in my bag. He slept well last night, but is exceedingly weak. I have been obliged to assist him every time he finds it necessary to change his posture, no matter if it is even to turn from one side to the other. The doctor told me this morning that Lockwood was in a dangerous condition, and in consequence I urged him to write to his family. Cross appeared to be about the same this morning, and was up at work splitting wood for exercise. Later, however, he seemed worse; and, in consequence of Bender's complaints, I put him in Lieutenant Lockwood's bag, having Jewell take Cross' place with Bender and Henry. The doctor this evening says that Cross is in a very critical condition, and undoubtedly stricken with scurvy. Putting him in the single bag makes it more comfortable for him, and brings

him next to Bierderbick, who is to care for him. It is interesting to note that Elison does not yet know of the loss of his feet, but frequently complains of pain in the soles or toes. An aurora was seen this evening at seven o'clock. Temperature, —36° (—37.8° C.)."

"January 18th.—Cross died to-day, at about 2 P.M. My attention was called to him by Jewell, who slept next him, about two o'clock in the morning, and, on lighting the lamp, he was found to be unconscious and partly out of his bag. The doctor examined him, and, by his advice, I ordered some brandy and soup to be given him, which were taken with great difficulty. He never recovered his entire consciousness. The doctor, after examining the body, reported to me, in French, that there were very pronounced signs of scurvy, and that his death must be attributed more particularly to that cause. He said that the dropsical effusion of the heart, which he stated to the entire party as the cause of death, was induced by insufficient nutrition, which, of course, means starvation. After Cross' death I made some remarks to the entire party, stating the general cause of his death to be that which was given publicly by the doctor. In order not to excite a feeling of depression among the party, I ignored the question of scurvy or starvation. Bierderbick, Brainard, Israel, Lieutenants Lockwood and Kislingbury, however, are aware of the facts. I enjoined the party to take courage, and not let this death have a depressing effect upon their spirits, pointing out that Cross' constitution had been undermined by his early habits, and that even when at Conger he had not been allowed to do field service, owing to his impaired physical condition. The party during the evening seemed to be in unusually good spirits, everybody making an effort to encourage others. Jewell's mouth looks very badly to-day. The doctor now makes it a rule to examine the mouths



OUR FIRST FUNERAL.—JANUARY 20, 1881.

of the entire party each morning. The day was a fine, clear one, but very cold; the temperature —40° (—40° C.). Lieutenant Lockwood is a little better, but still very weak."

"January 19th.—The temperature below the scale, which is —42° (—41.1° C.), all day. Cross' body was sewed up in sacks and canvas this morning by Brainard and Bierderbick, who performed this last service most tenderly. About noon I read the Episcopal burial service over Cross in the hut, and shortly after we went with him to the grave. Lieutenant Kislingbury and six men dragged the body on the English sledge, covered by the American flag, to the summit of the hill beyond the southeast end of the little lake, which I called Cross Lake. I accompanied the party, but the rest of the men did not go to the grave, owing to the limited number of Arctic overshoes and to the extreme cold. Bierderbick cast the dust on our first dead. The grave was dug fifteen inches deep—as far as our condition and the lack of proper tools would permit. A salute was to have been fired over the grave, but later it was thought unadvisable to use the ammunition for this purpose. All due marks of respect were paid the body at the house. Lieutenant Lockwood made some remarks concerning the dead man, who would have been forty to-morrow. We find that he had saved up a considerable quantity of bread and butter for the purpose of celebrating his birthday.

"Owing to Sergeant Brainard's report as to the manner in which the bags of bread are overrunning the estimate, I was enabled to-day to increase the bread ration a half ounce, which hereafter gives us seven ounces daily. This increase to a certain extent dispelled the gloom caused by our first funeral.

"Lieutenant Lockwood yet remains in my bag, and his presence has been a great comfort to me mentally, although the tax upon my physical strength has been great in assisting him to

rise for meals and to change his position while in the bag. Gardiner was twenty-seven to-day, but the only thing I had to give him, besides my good-will, was a half gill of rum. Ellis is the only one of the party who seems to be particularly depressed by Cross' death."

"January 20th. — The weather remains calm, clear, and very cold, the temperature being still below the scale. Lieutenant Lockwood made up his mind to-day to leave me, and so returned to his own bag. He is exceedingly weak; too weak, in my opinion, to be alone. I have been able in a manner to care for him. But as he expressed a decided preference for his own bag, owing to the room therein, and his ability to turn over without discommoding others, it settled the question. The party has been in excellent spirits all day."

"January 21st.—I regret that I have not insisted on Lockwood's remaining with me. Bierderbick says that several times during the night Lieutenant Lockwood was evidently wandering.

"He crawled over to my bag this afternoon, saying that he had something private to say to me. He then said that he felt he was in an exceedingly feeble condition; that it had been evident to him for several weeks that he was gradually breaking down, and that he had said nothing to me for fear of the injurious effect it might have upon the spirits of the party. He thought he had improved slightly within a day or two, but it was evident to him he would never be able to cross to Littleton Island with us on March 1st, the day on which I proposed leaving.

"I told him that possibly he might be, but in case he was not, it would be necessary for us to haul him as well as Elison. He said that the addition of his weight to the load must certainly prove destructive to the party; and that he requested,

as a favor to him, that when March 1st came I should give him his twenty-fourth part of the remaining rations, and leave here without him. He argued that if there was a party at Littleton Island, it could reach him and bring him back before his rations were gone; but that if there was none there, he must perish in any event. I said that I was sorry he had such an estimate of my character as to make a proposition of that kind to me; that, as commanding officer of the expedition, my duty obliged me to care equally for the party; but that if any favor was shown, or any sacrifice needed, it must invariably be shown in the future, as it had been in the past, toward the sick and helpless, and that I begged he would never mention such a subject to me again, as I could not think of abandoning any member of the party. I added that I appreciated his feelings of self-sacrifice in regard to the matter, but that to accede to his wishes would be a change of policy which I could not sanction; that he well knew I had persistently opposed any plan or arrangement which in any degree indicated a desire to save a portion of the party at the expense of the rest. The doctor later informed me that he deemed it necessary that Lieutenant Lockwood should stop the use of tobacco entirely.

"Jewell was exceedingly despondent last night over Cross' death, but to-day I succeeded in inspiring him with new courage. Rice added very materially to the good spirits of the party by an exceedingly interesting account of life and experience in the West India Islands. Brainard discovered to-day that at some time twelve cans of milk have been stolen. There is an intense feeling among the party over this news. In order to counteract the depression caused by Cross' death, and by the loss of the milk, I decided to increase the seal-blubber and hard bread slightly, so that hereafter the weekly ration for each man will be eleven ounces of blubber and fifty-seven of bread. The

announcement had an exceedingly good effect upon the party, who hail the increase with such joy and pleasure as would seem incredible to the rest of the world."

"January 22d.—Lieutenant Lockwood was in very depressed spirits this morning, owing to his deprivation of tobacco. It is to be noticed that a similar effect has been produced on every man when his supply has given out, or he has been directed medically to refrain from the use of it. Later in the day, however, he was in a better frame of mind, and seemed somewhat stronger. A mattress which was given during his sickness to Kislingbury, I assigned to-day to Lieutenant Lockwood, to whom, with Dr. Pavy, it originally belonged. My own mattress, now used by Elison, has never been slept on by me. Happily the general sentiment favors all consideration to the feeble. Jewell seemed despondent again to-day, and was disinclined to follow the doctor's instructions on several points, which I, however, have told him must be rigidly obeyed. Bender and Henry to-day were impudent and insubordinate in their language; the first instance of such spirit on the part of the enlisted men."

"January 23d.—A very strong gale has prevailed to-day, which sent the temperature within the house below 20° (−6.7° C.). I spent some time in giving a very elaborate account of San Francisco, and also read a great deal to the party from Spofford's American Almanac. The statistics regarding crops and articles of food are extremely interesting, as well as tantalizing, to us."

"January 24th.—I introduced a chronological table to-day, for a change in our mental amusements. The spirits of the party have been excellent, owing to the increase of ration, planned some time since, going into effect."

Of this Lieutenant Lockwood says: "The bread loomed up

in the plate to-night with a most comfortable appearance. . . . Felt well to-day. It is a great effort for me to expose my hands long enough to write this journal; they soon get cold and numb."

Sergeant Brainard says: "The general health of the party appears to be improving slightly under the late increase of ration. The social barometer has evidently risen several inches in the last two days."

Hospital Steward Bierderbick.

"January 25th.—Bierderbick is twenty-five years old, and was given, as has been customary, a half gill of rum to celebrate the event. He stands his hardships and privations exceedingly well, and although as steward he has been assiduously and constantly engaged in caring for the sick and disabled, yet I think he looks the best of any man in the party. In addition to commencing the 'Life of St. Patrick,' and reading statistical information from the almanac, I perfected a

chronological list of the principal events in the history of the world. After my stock of information was exhausted, I was materially assisted by Dr. Pavy and Sergeant Israel in extending the table."

Brainard notes this day his belief from observation that Smith Sound was open, but adds: "I will not, however, speak of it to my comrades, who think it frozen over, for fear that it would cause depression of spirits. It is better that their minds should remain in a hopeful state." This willingness to bear such a burden of ill news alone was not uncommon among our party, and it materially prolonged the battle for life of many who would have otherwise sooner lost heart.

"January 26th.—I was obliged to forbid the practice of eating tea-leaves, which the doctor thinks injurious in our present condition; only a few of the party have indulged in the practice. Jewell is in an apathetic and very depressed condition, and I have exhausted my patience and ingenuity in trying to revive his former courage and energy. I commenced feeding up Rice and Jens for their proposed trip to Littleton Island. They now receive daily sixteen ounces of bread, and the same amount of meat. Frederick, our cook, and Schneider are working their best to get the travelling gear into proper conditon for the *forlorn hope*."

"January 27th.—A clear, fine day, with increasing light; temperature, —36° (—37.8° C.). Owing to the disinclination of several of the men to follow the doctor's instructions, and to avoid the eating of tea-leaves, I to-day ordered that they be thrown away in future. We are burning our old leather boots, mixed with other fuel. Lieutenant Lockwood appears weaker. Ellis and Jewell are apathetic. Dr. Pavy and I discoursed on travel in Europe for the interest of the party. It is remarkable with what monotonous regularity I ask Elison

how many tons of various articles of food are exported from the United States yearly."

"January 28th.—Brainard's favorable report as to how the last bag of bread ran, and the increasing weakness of several, caused me to order the issue of sixty ounces of bread weekly from to-day. I ordered besides a half ounce of seal-blubber and an ounce of bread extra for to-morrow's stew, which has had good influence upon the men. Elison is to have three ounces extra meat on certain days, which I shall see that he gets. Lockwood appears to be saving up his food, contrary to the doctor's advice, and in consequence was directed to eat his allowance daily. He appears at times to wander, and then again to be in his senses. He is somewhat stronger to-day. Frederick commenced enlarging Rice's sleeping-bag and putting it in comfortable condition, so it can be used in the trip for crossing. Four ounces of blubber are to be given each day to Rice and Jens until they start across. Drilled Brainard and one or two others this evening in the chronological table. 'Coningsby' was finished last night, and our attention is now directed to Kane, whose record of his starvation diet creates in us an indescribable longing for even half as much food as his men had. Brainard saw a white fox, but unfortunately lost him, owing to a defective cartridge or imperfect lock. Mercury frozen."

"January 29th.—Chronological table by me, supplemented by a physiological lecture from Dr. Pavy. Lieutenant Lockwood's strength appears about the same. It is necessary to help him in and out of his sleeping-bag for his exercise in the passage-way, which is enjoined several times a day. Iron is issued daily to him, Rice, and Jens, and to the rest of the party, except myself, on alternate days. A fox was seen to-day, but unfortunately there was no gun. Bender was ordered to

fix it yesterday, but did not. We are using English tea which is damaged. There are many lively discussions as to its merits, compared with other tea."

The bluntness of our taste at that time is instanced by the fact that on one occasion our cook forgot to put the tea in the pot, and no one detected the omission, not even the cook himself, until he found the tea measured out in a can after he had drank the dirty water.

Lieutenant Lockwood says: "Several wordy disputes during the day; among others, one on the difference between coons, opossums, etc. We have a good many of these disputes, which often start off without any one fully understanding what any one else means. . . . One of the annoyances of this life is the difficulty we have in trying to cheat the stomach, and make our dole of food seem more than it really is. It is pitiable the value one puts on a miserable little piece of hard, coarse ship-bread."

"January 30th.—The shot-gun was fixed last evening by Long, Bender having neglected it. Schneider made a pair of blanket socks, and Frederick worked on Rice's outfit, while Bender commenced a lamp for Rice's use. Ralston made some stearine candles, and I worked an hour copying meteorological records to be carried by Rice to Littleton Island, and there deposited. Most of the party believe that Lieutenant Garlington is at Littleton Island, with ample supplies from the Yantic; but I have distinctly announced that I count on nothing but a very small cache, not believing that Lieutenant Garlington landed on his way north. There has been much dispute on this point, as Lieutenant Garlington's record assures us of a cache at Littleton Island, but does not say that he examined it. The same notice assured us there was a whaleboat at Isabella, which could not be found. The day has been very calm and clear,

so that Bache Island and other land to the northward has shown up distinctly. Eskimo Christiansen was troubled with cramps."

"January 31st.—A calm, threatening day, with low barometer and high temperature, — 6° (—21.1° C.). The party are in excellent spirits. I worked an hour and a half making up a record for Rice and a letter to Garlington, and letters to the Chief Signal Officer and to my wife. Lieutenant Lockwood appears a little better and somewhat stronger, though he is always assisted in rising by Eskimo Christiansen. Frederick worked all day on Rice's outfit, and Bender finished the lamp and cooking utensils. Ellis and Long each made their will, which I am to send by Rice to Littleton Island."

An Etah Native.
[*From a photograph by the Relief Expedition.*]

The end of January was an important season to us. We had already passed three months of darkness, with a mean temperature of —23° (—30.6° C.), and looked on our troubles as almost passed, though the sun was to be absent sixteen days longer.

Twenty-four yet remained alive, of whom twenty-two were in comparative health and strength. Though haggard, emaciated, and suffering, we were yet confident and hopeful. We hoped that Smith Sound was frozen over, and that if Garlington failed us at Littleton Island, yet Rice would bring to our help the gentle natives of Etah, who never failed Kane and Hayes in their hours of need and danger. Once among those Arctic Highlanders, we knew our safety would be assured.

CHAPTER XLVI.

PREPARATIONS TO CROSS SMITH SOUND.

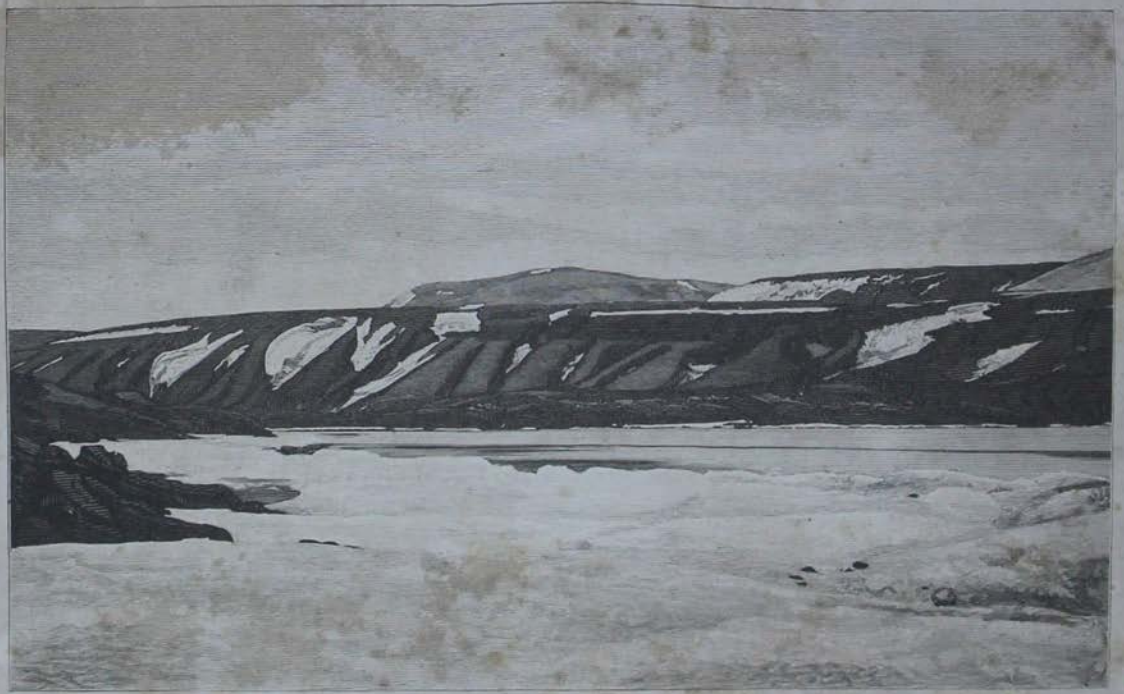
"FEBRUARY 1st.—The doctor thinks Lieutenant Lockwood weaker; and in consequence, although the doctor has not recommended it, I have decided to issue to him daily an ounce each of bread and meat. This issue has been made known only to Brainard, Long, and Bierderbick, as I desire to see whether this small amount of extra food will be of any benefit to him, the doctor insisting that his present weak condition results from mental depression rather than from lack of food. At the same time I announced to the party that from Sunday next we would have sixty-four ounces of bread and six ounces of dog-biscuit weekly, leaving us twelve ounces of bread daily from March 1st when we attempt crossing. The party are in very good spirits over the announcement.

"Bender, however, showed an insubordinate disposition to-day, and refused to obey my orders when I interfered to stop a violent and bitter discussion between him and Whisler. In consequence I sent him out of doors, with directions that he remain there until he was willing to obey my orders. He remained out about an hour before he would submit. Ralston made some candles from stearine to-day. I worked an hour, and completed my meteorological and other records which are to be sent by Rice. The day has been cloudy, with very low barometer and some wind. One blue and two white foxes have been seen. Lieutenant Kislingbury's nose bled very freely this

evening. Lieutenant Lockwood was very weak and childish and I am quite worn out by this continuous strain on me.

"I have given the letters, records, and his orders to Rice, who leaves in the morning to cross Smith Sound to Littleton Island. I send a list of articles most needed here, if he finds, as I fear not, a party at Life-Boat Cove. If he does not, he is to proceed to Etah, and hire natives to cross with sledge and dogs, leaving Jens behind. I give Rice needles, etc., for presents to the natives. The men generally are confident and hopeful, and I cannot discourage them; but, on the other hand, deceive no one by holding out false hopes."

"February 2d.—An important day for us. I called the cooks at 5 A.M., an hour earlier than is usual. Rice said that his outfit was perfect. I gave him and Jens four ounces extra of roast beef for breakfast this morning. Long killed a blue fox shortly before their departure, which we considered a good augury. They got away at 8.45 A.M., accompanied by Brainard and Christiansen, who carried their packs half way to the Neptune cache. Jens and Rice took six days' rations of sixteen ounces of pemmican, four ounces of blubber, twelve ounces of bread, two ounces of rum, and nearly six of alcohol for fuel, and have extra sleeping-socks, a cooking-lamp, and cup. The day was very bright and gives marked signs of the sun, which returns to us in about a fortnight, and Henry succeeded in reading the thermometer at noon by daylight. It is very cold this evening, the mercury being frozen, but the moon is shining, and will be of great assistance to Rice in his crossing. It is estimated that Rice has forty pounds to carry, and Jens thirty-five. They have one of Lieutenant Kislingbury's guns, the smaller. Lieutenant Lockwood attempted to get out of doors with the assistance of one of the men, but was too weak to go farther than the alley-way."



LIFE-BOAT COVE.

(From a photograph.)

Brainard says of Rice's departure: "A tremulous 'God bless you!' a hearty grasp of the hand, and we turned away in tears from those brave souls who were daring and enduring so much for us. We waited until their receding forms were lost to view in the bewildering confusion of the ice-fields, and then slowly retraced our steps to the hut. While watching their progress I distinctly heard the hoarse grinding of the pack not far away. Of this I said nothing to my companions, owing to the depressing effect such information would have on their minds."

"February 3d.—From to-day sixty-four ounces of bread will be issued weekly, and with an ounce extra for Tuesday and Friday for the present. Lieutenant Lockwood's extra issue commenced to-day. By the doctor's advice I issued but two-thirds of his ration of rum, given in two doses. The Eskimo, Christiansen, is in a very depressed condition this morning, and talks wildly, owing partly to Jens' absence, but more, I think, to the fact that he upset last night, in the dark, the meat belonging to his mess. The men generally are in excellent spirits. The day has been a very fine one, but is threatening to-night, and the temperature has risen from −40° (−40° C.) to −18° (−27.8° C.). We all speak frequently of Rice, and my thoughts are so much with him that I sleep but little, looking to the result of his journey with so much anxiety. Issued two ounces of lard to each man this morning, having decided, against Dr. Pavy's remonstrance, that it was not possible for him to use it all for Elison's wounds. At the rate it has been used for dressing the wound, I have reserved six months' supply. All very quiet after breakfast to-day, it being so rich with the lard, butter, and seal-blubber used in the 'sun-of-a-gun,' for which there was an extra allowance to celebrate our hopes.

"I find that several of the men have been eating little scraps of the cocoanut stearine which, covered with verdigris, is left

in the brass moulds, a practice which I found it necessary some time since to forbid positively. The general sentiment enforces my orders, but occasionally a man breaks over in secret. Connell and Jewell appear to be affected by the blubber, and Jewell fainted this evening in the passage-way, just after coming from out of doors. Brainard's face and limbs much swollen."

"February 4th.—Frederick had the misfortune to spill the rice belonging to his mess this morning, but gathered it up without any considerable loss. It is remarkable that the cooks have been able to prepare their food with so few accidents, considering the darkness and other great disadvantages under which they have necessarily labored.

"By the doctor's advice, I ordered that during the daytime the men keep their heads outside of the sleeping-bags, instead of keeping them covered up; and also that the butter issued for Friday should be kept until that morning before eating it. I also called the attention of the party to the necessity of obeying strictly any instructions they might receive from the doctor regarding the method of eating their food. Lieutenant Lockwood appeared stronger last evening, but this morning is very weak-minded. He can understand many things only after several repetitions of the subject-matter. I am continuing his extra ounces of bread and meat. Decided this morning, much to the delight of the men, that it would be practicable to have warm stews hereafter on Wednesday and Thursday, to consist of two ounces of lime-juice pemmican, two ounces of English beef, and three ounces of bread. Two ounces of bread each day is extra, thus making seventy ounces of bread this week, commencing Sunday. This continual changing of meals, with a small increase, has had a wonderful moral effect. If Brainard's report of a bag of bread allows three ounces

daily to be added for a week, I divide it in three or four portions. There was a strong wind in violent gusts last night, which caused me to feel very anxious for Rice and Jens. It was calm and clear, however, at nine this morning. Everybody in the morning was in excellent spirits, and Jewell was very bright. Brainard, who was seriously affected yesterday by his trip to assist Rice, was better this morning, but later he appeared to be quite indisposed. The doctor tells me that he can now answer for Elison's final recovery, and safe transportation to Littleton Island, under ordinary circumstances. The poor fellow, who has endured his great sufferings with such patience and fortitude, was out of spirits to-day."

"February 5th.—The doctor informs me that Brainard's symptoms look toward kidney trouble, and are very bad; and his chest, from certain indications, seems to be affected. He says that Brainard is in danger, unless he avoids exposure to the cold and violent exercise. Lieutenant Lockwood was much better this morning, being able to get up; but in going out he fell down in the passageway, and also after re-entering the hut. He said that yesterday his head was dizzy, and that he attributed it to stopping the use of tobacco. He yet fears the journey across the straits, saying we could cross, however, if we had enough bread and meat. We now have one-fifth more bread than I calculated on last fall. The party have improved a great deal, I think, on the small increase of rations.

Connell reported to-day that from the hill he could see the opposite side of the straits without any signs of open water. We all wonder where Rice is, and what results will flow from his trip. I spent an hour or more in giving statistics to the party. I offered to relieve Brainard in his exhausting and thankless task of issuing the week's rations, but he begged off, and I then directed him to divide his issue work into two

days, so as to avoid exposure to cold." Lieutenant Lockwood was so affected by the slight increase in our ration that in his diary of this date he wrote: "This week is to be a feast; our meals are fine."

"February 6th.—A windy day, with much drifting snow and a temperature of −20.2° (−29° C.). The much-talked-of warm stews of lime-juice, pemmican, and English beef commenced to-day. Dr. Pavy gave me a pair of dog-skin gloves, which he had loaned to Cross for the journey down, for my use in crossing.

"Lieutenant Lockwood seems a good deal stronger; and, much to my surprise, has shown a more cheerful spirit than before. I continue to issue him an ounce of extra meat.

"Later.—We were very much surprised by the return of Rice and Jens, about two o'clock to-day, quite well but much exhausted by their trip, especially Jens. Rice reports that he found open water extending from ten miles off Wade Point, and a mile off Brevoort Island, as far north into Kane Sea as the eye could reach. Happily the party does not appear to be very much affected by this unfortunate report. Rice said that at no time did he see the Greenland shore during his absence. There was much moving ice, with dense water-clouds, along the edge of the fast ice. He thinks he reached a point as far south as Littleton Island, and about ten miles distant from it. The only signs of game seen by the party during their absence were some old bear-tracks. Rice says that after a second day out Jens showed signs of fatigue and exhaustion, and frequently expressed himself as being weak and 'no good.' They got very little sleep and many falls in travelling over the rough ice in the utter darkness. The drinking-cup had a hole burned through it, and in consequence they suffered much for water. This evening, Lockwood was found up and travelling around the passage-way in his sleeping-socks."

Lieutenant Lockwood expressed the condition of affairs and the prevailing spirit when he wrote: "Of course we are all very much disappointed; the party take a bold front, and are not wanting in spirit. Our rations have been counted on to last until March 10th, there being a ration of twelve ounces of bread and ten ounces of meat for ten days in March to cross the straits. So here is the upshot of affairs. If our fate is the worst, I do not think we shall disgrace the name of Americans and of soldiers. I feel stronger to-night, but I have been in low spirits and alternately feverish and chilly. Singular, my spirits have risen this evening."

"February 7th.—Increased the ration slightly to-day to counteract the effect of Rice's return, and announced publicly that hereafter we shall have next week nearly eighteen ounces weekly of blubber and lard combined, in addition to our usual ration of several ounces. It is all a pitiful game of brag, and I shall have to reduce everything materially the coming week, but it had the desired effect. Rice and Jens are pretty well this morning, though naturally very sore. One of Rice's heels was much worn by his gear, and his nose and fingers appear to have been slightly frosted. Jens was nearly played out during the trip.

"Later, after racking my brain with a thousand fruitless ideas, I concluded to change my tactics somewhat, and so announced that it was more than probable Smith Sound would freeze over by March 1st. In such event, I argued, we could afford to deny ourselves a little, and so I had decided to cut down our bread a couple of ounces, so we would be able to remain here until March 6th, and have fifteen days' rations, on the basis of twelve ounces of bread and ten ounces of pemmican, with which to cross the straits. To give some cogency to my reasoning, I assumed that it was good logic for myself by de-

tailing five of the party on special duty, charging them to arrange everything for the abandonment of our hut and the crossing of Smith Sound on March 6th. I certainly do not deceive all the party, but probably I do some. Perhaps my plans may succeed, and this wide strait freeze solid, but I cannot now believe it. Strange to say, I never was troubled with this fear during the winter, perhaps because I was too busy doing each day that which came to me in the way of supporting and upholding the courage of the party.

"Arranged hereafter to have only two-thirds of a cup of tea, so as to save enough fuel to enable us to have warm stews daily. There was the usual diversity of expression as to the wisdom of this movement, but at any event it excites talk and keeps the party alive. Ellis and Lynn are cutting the wood this week. Jewell froze his fingers to-day, through neglecting to put on proper gloves when going out. Our poor starved bodies have not enough blood and vital heat to resist this temperature of $-27.5°$ ($-33°$ C.). Lieutenant Lockwood is the only one of the party to-day who has shown depressed spirits. I have been obliged to cut off, after to-day, his extra ration. He with Elison and Gardiner, have been the only ones to receive, as yet, an extra allowance."

"February 8th.—Mercury again frozen, greatly to our delight, for a week of this weather would cement securely the ice of Smith Sound. Bender was sick during the night, and Henry, who is sleeping with him, came to me and said that Bender believed that he was dying, and that he had a feeling that he was maltreated by the cook. Everybody scouts Bender's notions in this matter; but, in consequence of his exceedingly depressed condition, I have directed that the issue of food in his mess should be made by some member of the party other than the cook, so as to relieve his mind of even a suspicion of un-

fairness. Gardiner and others saw the Greenland coast, the sky being clear and the day very bright. After a discussion with Dr. Pavy to-day, I stopped the extra allowance of meat and bread which I had again thought of continuing to Lieutenant Lockwood, as the doctor said it was not absolutely necessary. Brainard, Rice, and Jens are better, and the majority of the party are in excellent spirits. Discussed generally the question of an outfit for crossing Smith Sound. Lieutenant Kislingbury is to ascertain what is wanting in hand- and foot-gear, Rice and Brainard to get up a list of weights which must necessarily be hauled, while Frederick, Schneider, and Ellis are to repair our clothing, sleeping-bags, etc. Lockwood was out for exercise to-day, and was so feeble that he fell down on the lake. Jens is somewhat depressed over the results of the late trip, and was found crying or moaning last night. I have encouraged him by judicious praise and hopeful expressions. I read to-day from McCarthy's 'History (of Our Own Times)' and Gardiner from Hayes' 'Polar Sea.'

"Brainard's private report to-night shows that we can remain here until April 10th, if we can subsist on four ounces of meat and eight of bread daily."

"February 9th.—Jewell very gloomy, and remained twenty-two hours in bag without speaking, or even stirring, except to eat his meals. It was with the utmost difficulty that I managed to get him out of his apathetic condition, and of course he displayed considerable temper, which is better than silence. Lieutenant Kislingbury submitted a list of hand- and foot-gear on hand and to be made. The day is very bright and almost calm. Jens has quite recovered himself, and Bender is much better. Lieutenant Lockwood is not so well to-day as usual. I told him he must cheer up; that, although some slight reduction of rations was necessary, yet I found that we could remain

here until March 10th, and still have fifteen days for crossing. This statement, as I had hoped, broke the force of my announcement that the bread ration will be reduced to eight ounces on Monday."

"February 10th.—A clear, bright day, with frozen mercury. Bender better; Salor, slight attack of diarrhœa. Jewell and Connell had to eat their breakfast in instalments, owing to the amount of blubber in the 'son-of-a-gun.' Bender discoursed this evening on Germany. Lieutenant Lockwood changed places with Jewell, and spent the afternoon and evening with me. He admits being very much depressed over our future, and laments his inability to help it. He said to the doctor that he must keep stirring him up; that he found it very trying and hard to do anything, and was beset by an uncontrollable feeling of indifference and apathy. Lockwood wanted a drink of water this afternoon, which fortunately I was able to give him from some which I had melted in a rubber-bag by the heat of my body."

"February 11th.—Frozen mercury again. Our condition regarding water is very trying, as it is a month or two since we have had any to drink. Lieutenant Lockwood, Dr. Pavy, Connell, and Henry, all expressed a strong desire for water this morning. I use no water myself, and withstand the thirst exceedingly well. Bierderbick reported he could hear very plainly this morning the roaring of the ice in the straits. Lieutenant Lockwood's mouth to-day looks very bad, being raw in a number of places. He thinks the excoriation is the result of drinking his tea too hot, but the doctor privately informed me that such was not the case. Bierderbick thinks that Lieutenant Lockwood's strength is improved somewhat, although he wanders at night as much as ever. The spirits of the party, as a whole, continue very good, but Whisler is very

much depressed; he said to-day that he did not believe we would ever reach Littleton Island. He is the first one who has ever made a remark of that kind. Israel suffers very much from constipation. Commenced to make foot- and hand-gear for crossing the straits, being determined to have everything in order in case they freeze over by March 10th. Frederick, although he is still cooking for the other mess, took general charge of the work, assisted by Schneider and Jens. Corporal Salor ailing. I began to-day issuing fifty-nine ounces of bread and five and six-tenths ounces of dog-biscuit weekly. We now have a warm stew in the morning four days in the week, and in the afternoon five days in the week. Schneider acknowledged to-day that he had taken and eaten two or three pieces of bread at different times during last autumn, but denies, as he always has, any knowledge of the milk. Sergeant Brainard overhauled our remaining provisions, and found a considerable less quantity of rum than was expected, as we calculated on the barrel holding the quantity certified to by the gauger. I was very much worried over the matter, as it could not be well explained, until Israel suggested that our English measure differed from the American one, which satisfactorily accounted for the deficit. In consequence of the small quantity, I found it necessary to order that no rum should be issued hereafter except medicinally. I ought to have thought of the difference in the measures, as it leaves us now with such a small quantity of liquor. I can only console myself by the reflection that it has been sparingly and judiciously issued.

"To encourage the men, I invited every one to express his opinion regarding the methods best calculated to utilize our wretched equipment for the proposed crossing. It all seems to be a mockery, but the men are surprisingly cheerful, and enter into the spirit of it."

"February 12th.—Temperature below —42° all day; but, notwithstanding the mercury is frozen, the water in the straits still remains open, probably in consequence of spring tides. The roaring ice, a dismal, fateful sound to us, was heard nearly all day, and dense water-clouds seen to the north and east.

"Lieutenant Kislingbury and Dr. Pavy had a very bitter discussion, which barely stopped short of personal violence. As it did not concern any official matter, I followed the rule laid down, and only interfered to save the general peace at the last. I have found that the most certain manner of retaining my influence over the men is to refrain from interference, except in official quarrels, other than by dissuasion. Bitter talk relieves the mind at times, and no blow has ever been struck; a remarkable record for twenty-five tortured and irritable men, who have not known a moment of comfort in these many months.

"Lieutenant Lockwood is stronger, and has been in better spirits to-day. He succeeded in getting out, by the aid of Eskimo Christiansen, for a short time. Dr. Pavy was accused openly, by Jewell, of selecting the heaviest dish of those issued out; and, in consequence of the fact being established by other testimony, I directed that in Lieutenant Kislingbury's mess, hereafter, the name of the man for whom any dish was intended should be designated as it was handed out by the cook. Our own mess have escaped any such condition of affairs, and have trusted implicitly in the honor of our cook. Indeed, were it not for four or five men, no complaints would have been heard from or restrictions imposed on the members of the other mess. Both Long and Frederick, in addition to their self-sacrificing duties as cooks, have repeatedly asked that a second man should divide the food, and that they might be allowed to take the dish rejected."

"February 13th.—Very cold and bright, but windy. Bache Island shows up to the north very brightly, and almost seems to reflect the sun's rays, which, however, are not due for several days yet. Dr. Pavy and Bender had violent words; in consequence of which the doctor told me he would never again prescribe for Bender unless he publicly apologized, which I told Bender he must do, although the doctor brought about the misunderstanding. Later Dr. Pavy had a quarrel with Whisler, and wished me to publicly reprimand him, which I declined, as there was no cause, the trouble having been commenced by the doctor. These continuous quarrels wear on me, for I never know how they will end, or what violence the wretched men may be tempted to commit, for in many ways death is preferable to life. I, however, keep my temper admirably for me, and smooth over troubles as best I can. I thought it best to-day to turn over to Lieutenant Lockwood a favorite pistol of his, which I brought down on my person at his personal request, and which he spoke of yesterday. His mention of it gave me an unpleasant feeling, for it looked as though he was putting his house in order. Dense water-clouds were seen to-day very near. Despite the open channel, however, the party remains in excellent spirits. Our mess met with a great misfortune this evening, as through mistake a quantity of salt water was put in our tea, and we were unable to drink it. We consequently had to go without drink of any kind, as there was no fuel with which to melt more ice. Long, our cook, felt exceedingly troubled over the mishap, but the fairness of our starving mess was such that every one cheerfully expressed himself as satisfied. Ellis to-day scraped his sleeping-bag for tobacco, and begged permission to smoke it, which I could not refuse.

"February 14th.—From to-day we are to have thirteen

ounces of seal-blubber and nearly two ounces of lard weekly. Dr. Pavy had words with Schneider, and later with Frederick, and complained to me regarding Lieutenant Lockwood. I visited Lieutenant Lockwood in the evening, and he informed me that he had implicitly followed all of the doctor's instructions. I found him quite despondent over his health, as well as our prospects. He is certainly weaker to-day, but was able to take a little exercise this morning. The doctor thinks the chances are that we shall have to haul him in crossing."

Lockwood says: "Lieutenant Greely came over to my bed awhile to make inquiries about my health, etc. He retains his strength and flesh very well, and also his spirits. We are all very dirty; our clothes covered with grease and dirt. My hands and face are absolutely black in color. I hope almost against hope that, if we are fortunate enough to find Smith Sound closed, I shall be well enough to get along without help."

"Brainard mentions that a piece of butter was stolen from his mess, and adds that 'Henry keeps his candle-moulds on the same shelf.'"

"February 15th.—Very bright, but windy. Nearly everybody expected to see the sun, as the sky was so bright in the south. Water-clouds still continue over the straits. Socks and mittens for the party are progressing well. With great exertion I repaired my socks this morning. Sergeant Gardiner found a small bag of English tobacco, which gave rise to very unpleasant talk; Gardiner promptly turned it over to Dr. Pavy, who claimed it. Schneider has replaced Ralston as our candle-maker, and we have been able for some time back to replace our Eskimo lamp by stearine candles, which give a better light and leave us the seal-blubber for eating. The stearine (cocoanut) is so strong and rancid that the doctor says its use as food would be injurious."

Lieutenant Lockwood says: "I do little talking, finding it difficult to raise my voice. I am pursued by ennui, aimlessness, apathy, and indifference, produced by hunger, cold, gloom, dirt, and all the miseries of this existence. I am very weak, both physically and morally, and find it impossible to shake these sad thoughts off; but my spirits to-day are better than usual, and those of the party very good indeed."

"February 16th.—Dr. Pavy examined all the mouths, and reported them looking well except Henry's, which is somewhat suspicious. Frederick finished a pair of boots for me for crossing, and took mine, which were large, for the use of some one else. Dr. Pavy requested two ounces extra of meat on alternate days for Elison, which I ordered, though it is hardly fair to the others, as Elison through all these dreary months has had almost double rations allowed him. I stretch a point for him, and am assured by the doctor that he is quite safe, if we can only get him across the straits and find either food or a party. Lieutenant Lockwood is better. Brainard reports that we have 265 shot-gun cartridges. The party in general continues in excellent spirits, despite the open water between us and Greenland."

Lieutenant Lockwood says: "The sun does not make us very enthusiastic. We are too near the end of our rations, with a very poor prospect of increasing them at Littleton Island. I see no chance of the straits being closed the end of the month. To my mind we must find game here, or else receive help from Littleton Island. It will soon all be decided, thank God!"

"February 17th.—Higher temperature this morning from the storm last night, but the day has been bright and calm. We have used the last of our seal-meat in a fine stew, and also the last of onion-powder, peas, beans, carrots, corned beef; and on Wednesday used the last of our English beef. In consequence

we have for future use the strongest and best food in the shape of boiled bacon and pemmican. The sun was above the horizon to-day for the first time in one hundred and fifteen days. Several, including myself, have not seen it since October 13th, when crossing Rosse Bay. Our fuel in wood is holding out remarkably well, and will do probably until March 5th. The cooks have displayed astonishing skill and economy, and have worked wonders with both food and fuel. There was no issue of rum to-day; the first Sunday we have been without it. Its absence did not seem to be much felt. I still issue a quarter of a lemon, which tastes as good as ever. We all thank God that the sun is once more back, although its rays cannot reach our hut for many days.

"February 18th. — Lieutenant Lockwood seems better, though of course very weak. Remarkably fine and clear morning. Issued this morning two ounces extra of American roast beef, which was very much appreciated. Rice visited the summit of Bedford Pim island, and had a fair view of the straits. He reports that the summit of the island is level, and sandy in places, with occasional immense snow-drifts, which feed the glaciers near us. He saw much open water with many large floes of ice, which to the east (true) appeared to touch and afford a possible passage across. A horseshoe curve above or near Cape Louis Napoleon indicates fast ice in that direction. It is apparent that only cold weather is needed to solidify the ice from Cape Sabine to Cairn Point, and so insure our crossing. The spirits of the party are improved by this report.

"Bender complained again this morning of short weight in bread, though he was offered the choice of any plate in his mess. Brainard's feelings were much hurt by Bender's remarks, but I urged that he ignore them. Long took a trip to

the northeast some four or five miles to-day for game; the only thing he saw was fox-tracks.

"February 19th.—A strong southerly gale set in last night, which abated about noon to-day. It raised the temperature above zero (—17.8° C.), and caused much dripping from the roof of our quarters, wetting and making us very uncomfortable. I have one very unsatisfactory consolation, that the ice has so melted above me I can sit up erect without my head touching it. Bender and Schneider had a quarrel in their sleeping-bag last night, and came to blows, the first which have passed in the expedition. As far as I could gather, Bender was the aggressor. I reproved both men, however, and told them such a condition of affairs was outrageous, and must not occur again; that we were men, and not brutes. Both felt that public sentiment condemned them. Elison is steadily improving, and Lieutenant Lockwood appears a good deal better. Ralston is threatened with a felon, an experience which several have had."

Brainard's journal says: "Smith Sound was an open sea; no ice of any kind was visible on its surface, and the waves and whitecaps were rolling in against the edge of the fast ice with a dismal roar, which sounded in our ears as the knell of our impending doom."

"February 20th.—A southerly gale part of the day. The cooks went hunting, but saw nothing except a raven, which is our first bird—possibly our neighbor of last fall, who left us in November. As Brainard remarked, we have suffered too much to allow this bird of ill omen to instil any feeling of superstition in our hearts. Lockwood is doing very well at present, and his mind is somewhat stronger. Rice started to climb the hill for a view of the straits, but was obliged to return, owing to the high wind."

"February 21st.—Lieutenant Lockwood about the same. He

has had very little to say to-day, and is evidently much discouraged. He amused us yesterday by suggesting that we could not eat crow, and hoping that our hunters would not kill the raven, as he had come back to keep us company. I said that I should shoot him for deserting a military command. Frederick and Bierderbick to-day got his (Lieutenant Lockwood's) clothing and outfit together for crossing the straits. The sun has not yet been seen by any of the party, but its rays have appeared to the northward, gilding the mountains near Cape Frazer. The English sledge, which had been drifted over with snow, was dug out by the party to-day. May we once again load and haul it over the Arctic highway!"

"February 22d.—Received this evening from Lieutenant Kislingbury a communication, recommending that, as soon as Smith Sound freezes over, he, with a party of the strongest men, be allowed to cross to Littleton Island for game or assistance. He based his recommendation on the ground that we cannot cross as a party. This proposal strikes me in no other light than an abandonment to their fate of the weak of the party. Eight men cannot be depended on to make this trip of seventy-five miles and not disable a man. Any accident in travelling would sacrifice the entire party, unless the disabled man himself was sacrificed. It being Washington's Birthday, I celebrated it royally with a "son-of-a-gun" and cloudberries, together with a fine pemmican stew. It took only forty ounces of extra lard, and as much extra bread, to make everybody happy. As usual the stew was 'the best yet.' God pity us wretched mortals!"

"February 23d.—This morning I brought to the attention of the party Lieutenant Kislingbury's recommendation. I pointed out that preparations for crossing as a party were rapidly progressing; and told them that the party cannot be

divided with my consent; that whether we can cross as a party or not could be determined only by trial; and, until we had exhausted all efforts, no man, as long as my authority remained, should be deserted or abandoned. If any messenger for a forlorn hope was needed, it should be the strongest and fittest man at that time. Nobody seemed to indorse Lieutenant Kislingbury's plan. Dr. Pavy spoke to me most strongly against it in French, although he refrained from expressing his opinion publicly. Lieutenant Lockwood was very much affected by the proposition, and called our prospects exceedingly dismal, but gave no opinion regarding it. Indeed, we have not been able to obtain one from him for several weeks; and, in view of his willingness to sacrifice himself, as shown by his proposition of a month since, it cannot be expected that he would urge the strongest of the party to pursue any course which would show consideration for him. He was not out for exercise to-day; a fact which, in consequence of my mental excitement arising from the discussion of Lieutenant Kislingbury's plan, escaped me until too late to urge it. Ellis also remained in his bag, and did not work as he had promised. He is becoming indifferent and apathetic, and requires watching and urging to keep him in good spirits."

"February 24th.—Another gale last night, which continues with great violence. Will storms never cease, so that our ice-bridge may form? Lieutenant Lockwood was up for exercise this morning, but failed to get up this evening. It is evident that he has grown much weaker during the past four days. He frequently asks for information regarding our meals and other daily details. His mental condition is evident to everybody but himself, and it is exceedingly painful to me. He was so strong physically and so dependable, and in his weakness is so patient and gentle."

"February 25th.—Another gale, with drifting snow; the barometer is falling very rapidly, and threatens us with a third storm. These heavy gales are very exhausting to me mentally, as I realize the utter futility of any hopes that the straits will freeze over during such storms. The view toward the Greenland coast still favorable to-day, but water toward the north was visible as far as eye could reach. Lieutenant Lockwood's condition worse; indeed, his state is alarming to me. The doctor says we shall certainly have to drag him in crossing. We have two thousand pounds without him. There are no signs of scurvy about him, only a general break of his physical and mental powers."

"February 26th.—A heavy gale again last night, which died away this morning. The barometer rose half an inch in twelve hours. Water in large quantities, indeed a veritable sea, toward the north of us. Opinions differ as to the prospects toward Cairn Point. Some think that the bridge has formed by the ice catching, and others say not. Lieutenant Lockwood seems better, but can dwell on nothing but the subject of food. The raven was again seen to-day."

"February 27th.—Henry's twenty-eighth birthday. I gave him half a gill of rum to celebrate it. Lieutenant Lockwood complains much of suffering from cold, although he has on five suits of underclothing. Brainard while hunting went on the hill to see the sun, but was disappointed. The last of our onions, dog-biscuit, and coffee reached."

"February 28th.—Water appears farther off from shore to-day than yesterday, and indicates favorable conditions for freezing over. A slight misunderstanding with Lieutenant Lockwood regarding the quantity of bread issued. Some unpleasant talk followed, but he disclaimed intending to reflect on the cook or issuing sergeant. It is the first

word of dissatisfaction with his rations; excusable in his condition."

Lieutenant Lockwood touchingly says: "Last night I had a few unpleasant words with Lieutenant Greely about a proposal to change the arrangement of the stews. Both of us were rather fixed. This constant hunger is very productive of ill-temper."

"February 29th.—Another violent scene between the doctor and Lieutenant Kislingbury. Better this than mental apathy, since starving men cannot keep the golden mean. The small sledge was brought into the house to-day and lashed. We are trying to delude ourselves with the idea that we shall have some opportunity of using the sledges and the foot- and hand-gear which we have prepared for crossing."

CHAPTER XLVII.

NEW LANDS AND VARYING FORTUNES.

"MARCH 1st.—To-day is the one which was fixed upon by me last fall for crossing the straits. We have lived through to this time on a ration thought to be impossible for sustenance of life, but now the fates appear to be against us. The straits are wide open, and if we only had sufficient strength to remove the boat from the building, we could now attempt a passage partly by sledge and partly by boat. The party generally is in excellent spirits. Spring opens with twenty-two of us yet in health, although very much reduced in physical strength from the small allowance of food. Elison and Lockwood are the only really sick men of the party. Elison has improved steadily, and is substantially well, the doctor says. His wounds have healed very much, and no suppuration is taking place at present. Concerning Lieutenant Lockwood, the doctor reports his mind yet affected. Owing to the doctor's persistent reports, and to avoid any show of partiality, Lieutenant Lockwood gave up his tobacco to me to-day. The day has been clear, but very windy. The sun has not yet been seen by any of us. Two ounces extra of pork was issued to Elison."

"March 2d.—Day stormy and disagreeable, and the sun not yet seen. The party in very good spirits, and an unusual amount of general conversation took place. There was considerable discussion as to whether the last storm broke up the ice lately formed. The last general issue of lemons, there being but

two or three left for medical purposes. Our last can of milk was opened for Elison. Schneider is to make twenty extra candles to be used in crossing. Lieutenant Lockwood appears stronger. The discontinuance of our Sunday rum was mentioned to-day for the first time, and then only by a single man."

"March 3d.—Much to our annoyance and regret, the day has been stormy and windy. I informed the party that we could hold out here, without any material reduction in our rations, until the early days of April, and can stay here until March 16th, and then have food to cross. My announcement seemed to have a good effect. Frederick made me a pair of sleeping-socks for crossing, which I hope to use, but very much doubt it. Lieutenant Lockwood visited me in my bag. He is stronger and in a better frame of mind than usual, though still despondent. He is hopeful but yet uncertain about his chances of being strong enough to walk across the straits. I told him that I intended to send a hunting party to Alexandra Harbor as soon as I made up my mind that we could not cross, and also other hunting parties into Rice Strait and near Cape Sabine. The sun has not yet been seen. The last butter was eaten to-day, and nearly all our vegetables are gone. We still have two issues of cloudberries and three or four of lime-juice. Brainard asked if I could promote Frederick vice Cross, whose duties Frederick so creditably performed. I have promoted him to be sergeant, hoping the action will have a stimulating effect, by keeping before the men a keener realization that there is yet a world and something worth striving for." *

"March 4th.—Wind and drifting snow all day, with the high temperature of −23° (−30.6° C.). It would seem as

* I regret to say that this and other similar promotions were disapproved of, on the ground that there was no precedent for them, and the promotions could not be regularly made by me.

though the elements were against us. We have two weeks, however, before I shall have to decide positively the question of remaining on this side. Bierderbick was quite sick this afternoon; he has been working too hard lately, being indefatigable in the care, not only of Elison and Lockwood, but of others who are stronger than he is himself."

"March 5th.—The last of our seal-blubber, corn, tomatoes, potatoes, and soup issued to-day—what shall we do in a few days? The storm, with drifting snow, still continues. The high wind made it very uncomfortable in the hut, sending the temperature down to 19° (−7.2° C.). In this weather frost forms and falls on us continually, wetting and chilling us to the marrow. It is with great difficulty I can manage to sleep an hour or two daily owing to the cold."

"March 6th.—The storm finally abated here to-day, but seems to continue in the straits, as many water-clouds are visible. We are to have but fifty-six ounces of bread weekly hereafter, and no dog-biscuit or vegetables; which is a great reduction, and causes much gloom. Henry complains of chest trouble. Bender to-night carelessly left the shot-gun apart, and in consequence a part has been lost."

Lieutenant Lockwood says: "I think the party are losing confidence. Food is our constant theme. Bacon rancid, and we eat the tallow in which it is packed; both are spoiled and very strong, but we eat them with relish."

"March 7th.—Calm and clear once more. Long put together the gun this morning, and went hunting toward Cape Sabine. Bierderbick cooked the dinner, as Long did not return until late. He had been as far as Brevoort Island, but saw only the tracks of two foxes and two bears. Rice saw two ptarmigans on the hill, but unfortunately had no gun, and they flew away before one could be obtained. We have hopes now of these

birds, which are winter denizens, since light enough has come to enable us to see them. Lieutenant Kislingbury went to the iceberg about three-fourths of a mile distant hunting, and saw some bear-tracks. The ice is very thin in places, and he was unfortunate enough to break through and wet his feet, from which he must suffer much, as his clothing must be dried out by the heat of his own body. I and several others offered to dry pieces for him, but he thanked us and declined. Lieutenant Lockwood is in a very morbid and unsettled condition of mind to-day. Rice was sick this morning, but at noon ascended Bedford Pim Island and saw the sun, the first time it has been seen by any one of the expedition for four and a half months. Bender in a fit of passion again. I cannot endure this state of affairs much longer I am afraid."

"March 8th.—Another most violent storm last night, which yet continues; no one was able to go out, except for ice, during the day. Conversation was very general and spirits high to-day. Lieutenant Kislingbury is stiff from his wetting, and Long also from his fifteen-mile tramp of yesterday. It is astonishing to us that Long is so active and energetic."

Brainard's journal on the 8th says: "For the first time this winter hair-cutting was indulged in. Those wishing their hair cut crawled to the foot of the sleeping-bags, and the barber passed along the alley-way devoting the briefest possible time to removing the matted masses of hair."

"March 9th.—Heavy gale again to-day, which this evening approached in violence the extraordinary storm of December last. It is certain that such violent storms must break up all the ice in the channel, and I think our chances of crossing are about gone. Unless mercury freezes I shall send Long and Christiansen to Alexandra Harbor on Tuesday, and I have given orders to prepare their outfit for the trip. Brainard is anxious

to go, but I cannot spare him. Rice and Frederick offered their services as volunteers to attempt recovering the hundred pounds of English meat abandoned in Baird Inlet last November, which I declined, thinking it too hazardous a journey for so little food. Bierderbick is to be our cook during Long's absence. Lieutenant Lockwood seems much better to-day. Elison is doing astonishingly well. Israel reports that his tobacco, left in the chronometer box, has been tampered with."

"March 10th.—Very heavy gale again last night, which has abated. Brainard and Rice hunted in different directions for ptarmigan, but saw none. Brainard had a full view of the straits, and reports that there is an immense quantity of ice in them, so that the chances of closing are increased. I think it is the ice driven down by the wind, and that it will change its position the first heavy tide or high wind. Frederick and Brainard, assisted Long in preparing his outfit. I allow him and Christiansen, during their six days' absence, eight ounces of meat and ten ounces of bread, six ounces of alcohol for fuel, and a pint of rum for medical purposes.

"March 11th.—Fortunately calm and clear, and the sun for the first time touched the roof of our wretched hut. I gave Long and Christiansen an extra ounce of bread and two ounces of bacon at breakfast. Rice and Ellis who went out to give them a lift, got off with the sledge at eight o'clock, followed at 9 A.M. by Long and Christiansen. Our hopes and good wishes are so much bound up in this important trip that we can scarcely wait the week to know what will come of it. There has been much discussion as to what will be its results. I am sanguine of success, owing to the many signs of game seen in Alexandra Harbor by Nares and Feilden in 1875. If the valley affords winter pasturage for musk-oxen and reindeer, we are safe, as Long is certain of obtaining game if he sees it. Lieutenant

Lockwood says that he counts on nothing but hares. Rice and Ellis returned at half past two, having dragged Long's sledge to the northwest end of Cocked Hat Island, on which they touched foot, the first white men probably who have ever been upon it. Long and Christiansen struck directly for Alexandra Harbor, the travelling being fair. Long saw a raven, but was unable to get a shot at it. Brainard saw ptarmigan tracks. Unfortunately the rear sight of Lieutenant Kislingbury's gun has been broken off and lost. It is uncertain whether the accident occurred when he was hunting a few days since or not. The day turns out to be an exceedingly fine one, the temperature −19° (−28.3° C.), which rose in the sun to −12° (−24.4° C.). The variability of spirits is shown much by a little incident to-day. Jewell has such faith in Long's success that he already imagines us supplied with game, and in consequence requested that I would permit him to go into Hayes Sound with the party that I have talked of sending for geographical purposes in May. This visionary trip I have talked of more to encourage the men than anything else. I have tried to keep in their minds the object of our expedition, and the last thing I did yesterday was to call Long to my bag, point out to him on the map just what was known of Hayes Sound, and instruct him as to the importance of noting everything to be seen to the westward of Mount Carey. 'Game in any event,' I said, 'but new lands when possible.' I have been three years in command of this expedition to-day, if my memory serves me right."

"March 12th.—A fine, clear day, which Brainard improved by hunting as far as Sabine. He was driven to the ice-foot a mile this side of the cape as the ice has broken up to a certain extent along the coast. The only sign of game was the fresh tracks of a fox. A strong westerly wind prevailed in the straits, with a great quantity of water-clouds. Bender fixed a

sight for Lieutenant Kislingbury's gun, so that the latter went hunting for ptarmigan. Israel and Jewell are again begging me to send them into Hayes Sound, if our food may be enough, for geographical work. Brainard has also volunteered, and Dr. Pavy adds his name. Frederick repaired my sleeping-bag to-day, and I took occasion to visit Lieutenant Lockwood, taking Bierderbick's place, who is now our cook. I had considerable talk with Lockwood, who is improving slightly both physically and mentally."

"March 13th.—A fine day. Rice saw ptarmigan tracks, and Lieutenant Kislingbury followed them without result. Elison is much better, and on Dr. Pavy's representations of the urgent need I have increased his rations to twenty-two ounces of bread and meat, double the amount issued to others. The sun struck the house to-day for the second time, and I was fortunate enough to see it; the first time in five months, one hundred and fifty-two days. Long returned unexpectedly, at 7.15 P.M., from Alexandra Harbor, both he and Christiansen very much exhausted. They saw no game and no tracks, except of a single fox. They examined thoroughly the valleys of Alexandra Harbor, and Long visited the western side of Mount Carey, and with his field-glasses looked westward into Hayes Sound, discovering three new capes on the north side, the most westerly of which I have named Cape Francis Long. The party travelled nearly seventy miles during their absence; and their sleeping-bags having frozen up, they were unable to get into them farther than the hips, and were compelled to get what rest they could alternately, one resting while the other walked. Long was taken ill during his absence. I have deferred talking with him to-day regarding his trip, owing to his exhausted condition. We are all terribly disappointed over the result, as I had counted with some confidence upon obtaining game.

"The fates seem to be against us—an open channel, no game, no food, and apparently no hopes from Littleton Island. We have been lured here to our destruction. If we were now the strong, active men of last autumn, we could cross Smith Sound where there is much open water; but we are a party of twenty-four starved men, of whom two cannot walk and a half dozen cannot haul a pound. We have done all we can to help ourselves, and shall ever struggle on, but it drives me almost insane to face the future. It is not the end that affrights any one, but the road to be travelled to reach that goal. To die is easy, very easy; it is only hard to strive, to endure, to live."

Smith Sound in July, with its midnight sun, its placid waters and wasting ice-fields, affords to the navigator a striking contrast to that sea after sunless nights have come, when, lashed by autumn's fierce gales, it is crowded by a dense pack of moving floes constantly being cemented into a whole by the young ice, and as constantly disjointed into a thousand fields by tides and high winds. But winter cold does its work, and when the returning sun once more begins to exert its benign influence on its frozen surface, the conditions are again changed; even if a mild winter, as in our case, leaves a mid-channel free from ice, yet the thickness of the main or new ice is such that travel, although tedious and dangerous, is yet possible. Unfortunately at this time our wasted frames had such diminished strength as rendered it impossible that we could even get the boat, covered with a winter's snow, from off our hut. Later, indeed, our efforts were unequal even to the task of clearing off the snow from the roof, when it commenced leaking through. After March 10th, I do not *now* think we could have hauled our sledge across Smith Sound, had the ice been firm, although with desperate courage and unbounded faith in our will and determination, I *then* thought it possible.

"March 14th.—I had a long conversation to-day with Long concerning his three days' journey, and enter the following notes from his verbal report: He saw no signs of game except a fox-track, which had been made across his trail in Rice Strait during his absence. He was driven back to us by not having been able to get into his sleeping-bag during his absence. Leaving Camp Clay at 9 A.M. of the 12th, he overtook Sergeant Rice and Private Ellis hauling his sledge at the east end of Cocked Hat Island. He saw a raven, but was unable to get a shot. At 11.30 A.M., he, with Christiansen, took the sledge at the west end of Cocked Hat Island, and started direct toward Alexandra Harbor. Reached Cape Rutherford at 2 P.M., and found that its apparent end was an island about eight hundred yards distant from the main-land. This island he crossed. Two miles southeast of the cape he had passed to the southward of a very low island, which was about a mile and a half distant from the main-land. Just before reaching Cape Viele he saw a valley, which, sloping gently upward, appeared to furnish a route toward Twin Glacier Valley. He concluded to follow up this valley, as the snow along the ice-foot was getting deep. The ice to this point was all smooth, and appeared to be new ice; that is, of this year's formation. The ice in Buchanan Straits, as far as could be seen, was smooth and favorable for travelling; consisting of level floes, and being free from hummocks. Before reaching the valley above mentioned, he made camp, at 7 P.M., on the west side of the small island near Cape Rutherford. They cooked supper, and at 8 P.M. attempted to get into their sleeping-bag, which was frozen up so badly that after three hours' exertions they were unable to do more than push themselves in up to their breasts. As there was no wind they tried to rest in that condition, but were unable to get any sleep; and, being nearly frozen, about 2 A.M. of March

13th, they concluded to get up and go on, which was done without cooking anything. They reached a point near Cape Viele, where tea was made, some bacon having been eaten on the way. At 8 A.M. they started up the valley near Cape Viele, taking some hard bread, rum, spirits of ammonia, and pemmican in a knapsack, leaving their sledge, sleeping-bag, cooking apparatus, and fuel at camp. Scarcely any vegetation was to be seen in the valley, which they followed up three or four miles, until they struck the ice-cap, a regular glacier, the northern of the two which discharge via Twin Glacier Valley into Alexandra Harbor. They crossed the glacier without difficulty. The whole country around was ice-capped, there being only two small pieces of bare highland visible between the twin glaciers. They found that the ice-cap extends to the southeast as well as into Alexandra Harbor, and that evidently it unites with the glacial cap which discharges into Rosse Bay. From the highest point east of Twin Glacier Valley Long had an excellent view to the northwest, and carefully examined the country with his glasses. Bache Island terminates in low land, while to the southwest of it was a small, rocky, high island, very much resembling in its structure Cocked Hat Island. Princess Marie Bay appeared to connect with Hayes Sound. All the western end of Bache Island is low ground, rendering it difficult to say just where the land ended or the water commenced. Some distance in rear of Capes Baker and Stevens the land rose gradually, and a range of low mountains or very high upland was seen, which, however, presented to his view no particularly prominent peaks. He could see the entire west end of Alexandra Harbor, but the valleys and capes were filled with snow, and no signs of game were anywhere visible. To be certain, however, they followed the ice-cap around, and descended to the water-edge near the head of the harbor. A

large glacier terminates at the head of the harbor, and about a mile and a half from the glacier was a low island, at right angles to the glacier and nearly extending across the fiord. They climbed up the west shore of the harbor, and attempted to cross the country between Mount Carey and the mountains to the southwest. They met, however, very steep cliffs of about two thousand feet elevation, which prevented their passage. To the southwest the country was ice-capped, and offered no chances for game. After nine hours' constant travelling, Long reached a point north of Mount Carey, from whence he was able to look to the westward into Hayes Sound. From Bache Island, commencing with Cape Stevens, he counted five capes on the north side of the Sound. On the south side the land was very high, with valleys filled with snow or ice extending inland from the Sound. About twenty miles to the west high land (Schley Land) was visible, and the coast seemed to trend to the northwest. To Long it appeared as though Hayes Sound terminates and the two coasts north and south unite, but of this he could not be certain. The weather was then clear to the westward, but somewhat hazy toward Cape Stevens. While the high land to the westward appeared to thus shut in Hayes Sound, yet the distance was such that he felt no certainty about it. Owing to Christiansen being somewhat demoralized by the adverse prospects, so far from the hut and no game, he concluded to return to the bag, which was done in as direct a course as was possible. Had it not been for the timidity of his comrade, he would have pushed across Hayes Sound to Cape Baker. They reached Cape Viele at 10 P.M., having been absent fourteen hours, and having eaten only four ounces of pemmican and a few ounces of hard bread during this time. They cooked some tea, and again attempted unsuccessfully to get into their bag. After tea, as Christiansen wished to return at once to the

station, Long concluded to start in. They travelled an hour and then went into camp, and once more tried to get into their bag, but could only cover their breasts. After having been in the bag about three-fourths of an hour, Long was taken sick with cramps, and was much exhausted by the severe pain. Christiansen got out, heated a little rum, and gave it to him with some spirits of ammonia, which soon set him right. Christiansen kindly remained out of the bag, and, pulling the flap over Long so as to permit him to get some rest, made tea. After drinking it, and eating four ounces of bacon, they started, about 5 A.M., for Camp Clay; but on reaching Cocked Hat Island, about 2 P.M., were so much exhausted that they stopped and had some tea and four ounces of pemmican. They reached Camp Clay at 7.15 P.M. quite exhausted, but in no ways injured or frost-bitten.

"Both Long and Christiansen are somewhat stiff to-day, but are otherwise well. The iron endurance and great energy exhibited by these emaciated, starving men in this extraordinary journey astonishes me. Long has added to his and our laurels by extending Hayes Sound at least twenty miles beyond the farthest of our predecessors. Long's opinion is to the effect that the western extension of Hayes Sound presents no chance of game, as the valleys of the entire southern side of it are ice-capped or filled with snow. The appearance of the country on the north side seems more favorable to game, and he thinks it possible that something might be found in the neighborhood of Cape Baker; he expresses the desire to try later a trip in that direction, with Brainard, who volunteer to replace Christiansen. Brainard, hunting to-day, brightened up the party somewhat by killing three ptarmigans, the first game since early in February, when a fox was killed. Elison, who is in wonderfully good spirits, says that Brainard has broken our evil spell. It cer-

tainly encourages us to get a little additional food at this critical season. Rice improved the fine day by crossing Bedford Pim Island into Rosse Bay, which he did in three hours. He visited a number of the grounded bergs hoping to find seal, but saw no traces of them. He then went down the island, coming out near Payer Harbor, and reached camp at 7 P.M. He saw a raven, but no other signs of game. The ice in the straits he says is very much improved, and to the northward it is closed a great deal, but there is much open water south of Cape Sabine."

"March 15th.—Had our last regular morning stew; but a small quantity of beef extract and four spoonfuls of potatoes remain. In our stew to-day we had two ounces of bread, one of bacon, a third of an ounce of potatoes, and a half ounce extract of beef to each person. Dr. Pavy says that Gardiner's finger can be called well. He has been unable to use it ever since the last of September. Brainard and Jens hunting, but neither saw game. Lieutenant Kislingbury visited the water-pool, and made us very hopeful by reporting five dovekies in winter plumage, and the tracks (three days old) of a bear followed by a fox. A fine clear day, with a temperature of −30.8° (−34.9° C.). Three ptarmigans killed by Brainard, which weigh three pounds and ten ounces. They were plucked and issued; beaks, claws, and entrails being eaten."

"March 16th.—The day remarkably fine and clear, with a temperature −34.7° (−37.1° C.). Our last "son-of-a-gun" to-day. Lieutenant Lockwood is weaker than yesterday, but he seems now to be in good mental condition. Long and Christiansen, with the kayak, went to the open water. They returned about two o'clock, Long having killed four dovekies in winter plumage; they weigh four pounds exactly after being plucked. Several other dovekies were seen and a small seal, which Christiansen fired at but unfortunately missed. The entire

party are delighted at the game, and feel much encouraged at the prospects. The ptarmigans eaten in to-night's stew were very fine.

"Brainard made an improvement on my plan of last autumn to dredge for mussels, and suggests that we try and catch shrimps. Certainly our men are full of devices, and we shall yet make a brave fight for our lives."

"March 17th.—Saint Patrick's Day. Obliged to reduce the ration to seven ounces of bread and four ounces of meat. The temperature high, being −25° (−31.7° C.) at 6 A.M. Lieutenant Kislingbury and Jens hunting; the latter killed a ptarmigan weighing twenty ounces. Lieutenant Kislingbury saw a small seal near Expectation berg, as some one had named the immense grounded floeberg near us, but got no shot. Two ounces extra bacon issued to Elison, making twenty-four ounces against eleven ounces to the others."

"March 18th.—Twenty-one years ago to-day I was promoted to be an officer in the volunteer service. Strong wind and drifting snow prevailed, so that Long could not hunt. Christiansen's feet are badly swollen; a dropsical effusion similar to that experienced by Brainard some time since. The doctor thinks it advisable that Christiansen should not be exposed to cold, and so he can no longer hunt. The trip with Long substantially broke him down, as did that of Jens with Rice—a commentary on the comparative endurance of the two races. Lynn, whose mind has appeared to be shaken ever since his terrible experience on the Isabella trip, is apparently giving up. Apart from Lockwood, Lynn, and Elison, no one is disabled, though several are very weak."

"March 19th.—Strong wind and drifting snow again prevent hunting; it is almost maddening to lose these days."

"March 20th.—Temp., −20.2° (−29° C.). Long hunting,

although the day was not good; saw two dovekies. Three owls or falcons (probably the former), flying northward, and the raven were observed to-day. Rice went out hunting shrimps, putting into practice my idea of last autumn as improved by Brainard, but he was not very successful, as he caught only a couple of ounces. Christiansen nearly disabled the Remington by putting a stick down the barrel to force out a tight shell."

"March 21st.—A storm prevents hunting. Lieutenant Kislingbury, who has been troubled with a carbuncle on his finger, had it lanced to-day by the doctor. He fainted, and was afterward sick at the stomach. Jens is also troubled with dropsical effusion, so it is a question as to who will hunt, he or Christiansen, since both are sick and neither should go, the doctor says; I have cut the gordian knot by sending both on alternate days. A net was made in which to catch shrimps; an improvement on Rice's plan of yesterday. Gardiner was anxious to do something for the common weal, and so fixed up a rake for dredging, hoping to get some mollusks or sea-weed. It is surprising with what calmness we view death, which, strongly as we may hope, seems now inevitable. Only game can save us. We have talked over the matter very calmly and quietly, and I have always exhorted the men to die as men and not as dogs. There is little danger of these men failing in the dire extremity, for the manly fortitude and strength of the many compel respect and imitation from the few. Other than Henry's blasphemous remarks, I have heard none speak of our coming fate, other than with decency and respect. I have instanced, as a fine example of the spirit with which men should meet death, the English troop-ship, when the men, drawn up at parade-rest, went to the bottom of the sea without a murmur, while their wives and daughters filled the boats. One supreme effort is

easier far than this long-drawn-out agony, when, too, it is easier to think of death than to dare to live."

I may add that the story of the troop-ship appealed strongly to us as soldiers, and I doubt not my men would have gone to the bottom of Baffin's Bay, with the same spirit had their condition even been equally hopeless. The Birkenhead was often alluded to by us.

Lieutenant Lockwood says: "The time draws near when our group comes to an end. We look on it with equanimity, and the spirits of the party, with this prospect of a miserable death, are certainly wonderful. I am glad as each day draws to an end. It puts us nearer the end of this life—whatever that end is to be. The fuel, except the boat, ends to-morrow. Talk all the time on the subject of food."

"March 22d.—Rice tried the shrimp-net to-day, and brought in about a pint of minute shrimps. He thinks he can get a quart daily, which will be a considerable help to us. Long and Jens hunting. Ellis carried out the kayak for them. Long reports that the ice extends about three miles farther out than on the 17th. This is very encouraging for closing, but I have given up the idea of crossing, as our strength and rations would not permit such hard work now, and we must be even weaker when the straits close, if at all. I have concluded that on April 1st I shall reduce the rations to a basis which will enable us to live till May 1st."

"March 23d.—Brainard came in this evening hardly able to stand after a trip into Rosse Bay. He visited the glacier front, which he finds advances all winter, but there were no open water-pools as he hoped for. He visited many grounded bergs, but saw no signs of seals or walruses. Rice, indefatigable as ever, was out at 3 A.M. for shrimps. Unfortunately he overturned his net, and brought in only a few ounces. The nets are

set at the face of the glacier over a mile toward Cape Sabine. The overhanging face of the glacier is jammed by the main floe at high tide, but as the water falls a crack opens, which permits the nets to be set and drawn at or near low tide. The water is nearly thirty feet deep at high tide. Rice reports that there is a large bone, presumably the rib of a Greenland whale, visible at the bottom of the sea. He observed it while trying unsuccessfully to obtain sea-weed. Bender has made a fish-hook, as Connell thought he might do something with it."

Lieutenant Lockwood says: "Lieutenant Greely announced this morning that we could run along on the present ration until April 6th; and then, by cutting down to three ounces of meat per day, without bread, we could exist until about May 1st. This is most encouraging. Our present ration is so small, however, that it remains to be seen what the effect of any further reduction will be. We are hungry all the time. It is impossible to fix our thoughts for any length of time on anything but food. We have various seal-skin articles of clothing which we talk of eating."

On March 24th the entire party nearly perished by asphyxiation from the fumes of the alcohol-lamp used in cooking, as our wood was all gone except the boat, which I dreaded to touch, although it was useless except as a roof. It had been the custom to close with rags the tin can which formed the funnel through the boat, so that as much heat as possible could be retained in the hut at night. The cooks had forgotten to remove the rags, and in consequence the alcohol-lamp burned poorly. This drew attention to the fact that the rags were still in the funnel, and they were at once removed. About this time Sergeant Israel complained of nausea and dizziness. I spoke to Dr. Pavy regarding it, and he advised Israel to lie down, saying that he would be better in a few minutes. Shortly

after Bierderbick, on the other side of the hut, fainted, and the doctor went to his assistance. Sergeant Israel then became unconscious, and while I was devoting my energies toward restoring him to consciousness another man became faint. Sergeant Gardiner called out, "It is the alcohol; open the door, open the door!" The door opened, every one who was able, with one or two exceptions, crawled out of the hut, some fainting by the way. On emerging from the passage-way, I saw Brainard stretched upon the snow perfectly white and apparently dead. Whisler fell down, and I went to his assistance; but, before reaching him, lost my strength and fell to the ground. Gardiner came to my assistance, and with difficulty got me on my feet, and tried to put a pair of mittens on my hands, which had already commenced freezing. Whisler also tried to assist me, but Gardiner falling to the ground, we turned our attention to him. By this time Brainard had recovered consciousness and was able to rise. Strength and consciousness returning to us, we realized that we were freezing, the temperature being about $-25°$ ($-32°$ C.). It was remarked afterward by all the men who got out of the hut, that every one attempted to assist his neighbor except Henry, who held himself aloof, evidently caring for no one but himself. Those who had been more or less affected within the hut fared better, escaping as they did the frost-bites which fell to the lot of those who ventured into the open air. Doctor Pavy and one or two others were not affected, but Bierderbick and Israel were very near unto death. Several of the men were sharply frost-bitten; Sergeant Brainard suffering the most of any one, except myself. My hands were frozen so severely above the second joints that a week passed before I was able to even feed myself, and nearly two weeks before I could use my fingers without great suffering. A half gill of rum and two

and a half ounces of extra bread were issued to each man to replenish our strength after such exposure and experiences, and Brainard, notwithstanding badly frozen fingers, went after and killed a white fox weighing over five pounds. After order was restored, and the breakfast cooked, it was found that a piece of bacon had been stolen. Curses loud and deep were heaped upon the man who would be base enough to steal the food from his comrades, who were striving against death in another form than by starvation. A few hours afterward I gathered in conversation that suspicion rested upon Henry, and later learned that "Our little man" (as we called Eskimo Jens) had seen him take the bacon and conceal it within his shirt. In the meantime, those who suspected Henry kept watch on him. Just before dinner he complained of nausea. The meat for dinner was divided, and Henry, in my hearing, said, on taking his portion, "I'll put this away." In a minute or two afterward, becoming sicker, he vomited. Frederick found, when it was emptied, that the can contained a considerable quantity of undigested and scarcely masticated bacon.

A general investigation of Henry's conduct was had on the 25th, which clearly established his guilt, not only of the bacon, but that he took a double allowance of rum after the theft. It further transpired that he had been a thief at Conger, and was more than suspected of tampering with our provisions the preceding autumn. Commencing with his own friends and sleeping companions, each man in turn pronounced him guilty. There was much suppressed talk of proceeding to violence, but I simply remarked that it was a military command, and that I would take extreme measures when needful. Since I had spared an officer these many months, on grounds of indespensable service, I was unwilling to deal otherwise with a private. I relieved Henry from any duty; and, the party being too weak

to put him under confinement, I prohibited him from leaving his sleeping-bag except under the supervision of one of his comrades. Two days later it was found that ten ounces of English chocolate reserved for Elison had been stolen. All circumstances pointed to the belief that Henry had stolen it before the 24th, but nothing certain could be proved.

Brainard, on the 25th, says of the returning hunters: "Christiansen came in greatly exhausted and almost unconscious, having been supported and half carried by Long from Cape Sabine. Had it not been for Long's timely aid, he must have perished from the cold. The shrimps are now mixed with our stews, and are quite palatable. The minute animals have opened up to us a new avenue of escape. Snow has been removed from the boat and holes cut through. For the first time since we have occupied the hut, a meal was cooked without artificial light."

For the first time in five months a ray of outside light entered our wretched hut, and recalled home, and light, and warmth, inspiring all with renewed hope and vigor. Lieutenant Lockwood says: "For several hours we got along without candles. We are all confident now of pulling through and the spirits of the party are excellent." I recall vividly the effect it had on me as the first rays of entering sunlight disclosed to my view the scene of utter squalor and misery in all its wretched details. For a moment the ennui and pain, the cold and hunger that had abided, the physical weakness and mental irritation which had come, the heart-sickness resulting from blasted and deferred hopes, and the impotent and maddening rage at our utter helplessness, rose up before me; and, though not an expressive man, I turned and said to my astronomer in the bag with me, "How have we ever passed through this hell on earth and kept our reason?" But with the bright rays of sunlight came

instantly other thoughts, of the patient courage, the enduring fortitude, the unwavering loyalty, the great self-denial these men had shown through almost endless months, and I added, "I shall ever think better of mankind for this ordeal."

On the 26th Bierderbick was relieved as cook, much against his will, owing to anæmia, induced by overwork and of course lack of food. A violent storm that day quite exhausted Brainard and Rice, who were hunting and shrimping. Rice, however, brought in some shrimps, and also a few crustaceans, which I ordered saved as a scientific collection, and issued a gill of alcohol to preserve them. My idea ever was to cultivate the thought of something else besides our wretchedness, and so through all the terrible winter regular observations of the barometer, thermometer, wind, and weather were made and recorded, and now near the end our collection slowly grew.*

The violent storm of the night ceased on March 27th, my fortieth birthday. The party were all very kind in their expression of good wishes for my future. I did not care, in our

* The specimens collected under such desperate circumstances were:

1. Hippolyte polaris, one specimen of the form originally described as H. borealis.

2. Arcturus baffini, one specimen.

3. Polynoe scabra, one specimen.

4. Phyllodoce citrina, one specimen, remarkable for its large size.

5. A cluster of eggs of Buccinum, perhaps Greenlandicum.

6. Margarita umbilicalis, two specimens.

7. Margarita helicina, of the form called var. campanulata, two specimens.

8. Mya truncata, the common Arctic clam, one specimen.

9. The ubiquitous Strongylocentrotus drobachiensis, two small specimens.

10. Ophioglypha robusta, thirteen specimens.

11. A single specimen of a small crinoid, which cannot at present be identified. It is a species of Antedon, but not the common Greenland form A. eschrichtii, nor A. dentata, which it closely resembles.

The mollusks were identified by Mr. W. H. Dall.

distress, to take the usual half gill of rum to celebrate. The day was celebrated notwithstanding. Rice made four trips, and succeeded in getting twelve pounds of shrimps. The great event of the day, however, was Long's success in obtaining game. He and Jens went out beyond the grounded bergs, and Long killed thirty-eight dovekies, of which Jens secured thirty-three by means of the kayak. Long had for several months promised to obtain something in the way of food as a birthday present for me, and was exceedingly gratified that he had been successful. I cannot say how grateful we were for his success, nor express how great was the enthusiasm and hopefulness excited among us starving men. Brainard says: "Long was the hero of the hour; cheer after cheer was given the hunters, and general good feeling prevailed."

Schneider was doing well, and trying to redeem himself in the eyes of his comrades. Salor, on hearing of the dovekies, carried out the kayak for Jens, and Lieutenant Kislingbury and Connell took out ammunition when the first supply failed. The day was calm, clear, and fine, with a temperature of −8° (−22.2° C.). Lockwood was somewhat better, but Christiansen remained on the sick-list, and Ellis complained of sickness, which the doctor thought arose from his surreptitiously eating bits of rancid stearine which were covered with verdigris. Henry, after the birds came, begged that he might be allowed to do duty, saying that I would kill him by treating him so harshly.

On March 28th Rice was very successful, and got twenty-seven pounds of shrimps, while Long secured fourteen dovekies and Christiansen shot a ptarmigan, so that the party now looked forward with high hopes to the future. Brainard went to Sabine hunting, and his journal says: "I found (around Payer Harbor) many traces of ancient Eskimo encampments, and the

remains of a wooden sledge with bone shoes. They were carefully placed together in a conspicuous position. The evening readings, which have been so much of a gratification to us in the past, are discontinued, owing to the inclination of some to sleep rather than hear them. Any vessel could steam up Smith Sound without difficulty or hindrance. The water washes against Cape Isabella, and probably extends to the Greenland coast."

Another ptarmigan was shot on the 29th, on which day Brainard notes Elison's inquiring if the doctor could not do something for his feet, which itched uncomfortably, unconscious that they had been gone since early January.

Frederick was ill and Christiansen fainted on the 31st, but otherwise the party showed little change since February, except more pronounced feebleness from the reduced diet and the substitution of shrimps for meat and bread.

Although March passed from us with violent gales, which confined us all to the hut, yet we looked forward with hope and expectation to April, which had brought us seals and game even in Grinnell Land.

CHAPTER XLVIII.

THE BEGINNING OF THE END.

APRIL opened favorably, for Long killed eleven dovekies and two ptarmigans, and saw a seal and walrus. On the 3d we had yet remaining five pounds of meat, three of bread, and nearly two of stearine to each man. Rice, too, was bringing in from twenty to thirty pounds of shrimps daily, and reported that sea-weed, or kelp, was visible, and might be reached, he thought, at the spring tides. Our first really depressing day came with April 5th. The night before Christiansen, one of the Eskimos, had been somewhat delirious; but in early morning he grew worse, and at nine o'clock died. During the previous week considerable extra food had been issued him in the hope of saving him. His body was carefully examined by Dr. Pavy and Steward Bierderbick. The doctor reported that a few illy-defined signs of scurvy were visible, but that death resulted from the action of water on the heart induced by insufficient nutrition. We dreaded to use or hear the word starvation, but that was the plain meaning of it. His death could not fail to have a very injurious effect on the weak and despondent.

Lieutenant Lockwood says of him: "He was a good man, and I felt a great affection for him. He certainly worked hard in my service, and never spared himself on any sledge trip. His death makes me feel very sorrowful." He also says: "I have felt a great difficulty for some time past in eating shrimp stews, and have had to force them down to some extent. Fort-

unately Jens and I are the only ones affected in this way. I find myself still weakly; to-morrow morning I may be cut off."

I had recommenced my diary, discontinued owing to badly frozen hands, which says: "The spirits of the party are undoubtedly affected by Christiansen's death. Lynn is in a very bad condition. Besides him, only Lieutenant Lockwood and Jewell are in immediate danger. Preparations have gone steadily forward for Rice's trip, which I look upon as inevitable."

On Sunday, April 6th, Lynn became unconscious at 1 P.M., and died at 7. He asked for water just before dying; we had none to give. It was noticeable, in after cases, that almost invariably from six to twelve hours before consciousness ceased thirst began, and a request for water was repeatedly made. Lynn's death affected us all deeply. He was a strong, vigorous man, of even temper, simple in his manners and tastes, a kind comrade, a faithful soldier, whom all liked and respected. In three years' service I had but one occasion to criticise his conduct. It had long been evident to us that his dreadful experience on the Isabella trip had shaken him terribly, breaking him physically and weakening him mentally. During the winter he had repeated almost daily, in season and out of season, the motto of Kentucky, "United we stand, divided we fall." I had strenuously inculcated that idea, and I doubt not that its pathetic reiteration by Lynn most impressively stamped it on the mind of even the dullest, to the advantage of discipline and unity.

I issued four extra ounces of meat to Lieutenant Lockwood, and a half gill of diluted alcohol to each one of the party, feeling it necessary to counteract the depression of spirits arising from Lynn's death. Lieutenant Lockwood says of Lynn: "His death was a good deal of a surprise to me, and has cast a gloom on the party during the day; he was much liked and highly spoken of by all. The burial service was read here at

the hut by Lieutenant Greely, and then the body taken to the cemetery on the sledge." Of himself, he says: "I find myself almost as weak as ever again. I have not been out to-day or yesterday. I took a little exercise in the hut to-day. Had a few ounces of dovekies issued to me yesterday and this morning in addition to the regular fare."

Near midnight of April 6th, Sergeant Rice and Private Frederick started southward to Baird Inlet. They went to attempt the recovery of the hundred pounds of English beef which had been abandoned in November, 1883. Such abandonment, it will be remembered, was necessary to save the life of Sergeant Elison, then dangerously frost-bitten. The journey had been proposed by the two men about the middle of March, but I had persistently objected to it, foreseeing the great chances of a fatal result. The men, however, represented to me the desperate straits to which we were reduced, the value of the meat if obtained, their confidence in their ability to find the cache, and the certainty of their strength being sufficient for the journey. They asked but one favor, that they be permitted to make the attempt on the same ration as that issued to the general party—four ounces of meat and four ounces of bread daily. In such case they said no injury could result to the party in the event of failure. The provisions might be increased, they could not be diminished.

At first I refused to countenance the attempt, but as the days passed and the strength of the party waned, and death to some seemed imminent, I felt the necessity of yielding. I accordingly decided on the trip, and fixed April 1st as the day of departure, provided the weather was good and our prospects not improved. The success of our hunters, Long and Jens, in obtaining birds, on March 27th, awakened hopes that the journey would not be necessary, and the departure was consequently

postponed. Early April brought no relief, and game again failed. Christiansen's death decided me. I no longer hesitated, but gave the final orders. The orders were verbal. Detailed instructions to such men on such an errand would have been unwise, if not culpable. Rice was regarded naturally as the leader of the forlorn hope, and to him the orders were given

Sergeant George W. Rice, our Photographer.

simply to go and do the best he could. I, however, cautioned him particularly against over-exertion, knowing his great ambition and fearing for his strength. He had not been well on Thursday, and I had asked him to be fair and candid, so that I might not send a sick and unfit man on so trying and dangerous a journey. I told him that Sergeant Brainard, ever willing and anxious to serve us all, had expressed more than willingness to

go in his stead. He on Sunday noon came into my sleeping-bag, and had a long talk over the situation. Rice declared that he had recovered entirely from his indisposition, insisted that he was as strong as Brainard, and that the duty should come to him, not only as the originator, but on account of his knowledge of the locality and his familiarity with the appearance of the ice as gained from two trips to Isabella.

In order to avoid the long detour through Rice Strait, he decided to go direct across Bedford Pim Island.

The sledge, loaded in the morning, was hauled during the day to the crest of the island by Lieutenant Kislingbury, Brainard, Ellis, and Whisler. They returned about 6 P.M., thoroughly exhausted by their labors. Whisler was much bruised from frequent falls on the glacier by which they had descended.

After a final consultation with me, Rice, in default of other sleeping-place, his bag being with the sledge, crept in with his comrade, Lynn, who had just died. He slept for a short time with the dead, unconscious that in a few hours he, too, would pass away.

When Rice and Frederick started, our hearts were almost too full for utterance, but we managed to send after them a feeble cheer, that they might know our prayers and Godspeed were with them on their perilous journey. Their outfit, though our best, was simple: A rough, common sledge (the one brought back by the rescuing squadron), a two-man sleeping-bag, a rifle, an axe, an alcohol-lamp, and a small cooking-pot. No tent was available; nor had there been, would their enfeebled condition have permitted them to haul it. For food, very much against their inclination, I increased the daily ration to six ounces of bread and six of pemmican, with a small allowance of tea. A cooking ration of five ounces daily of alcohol

was granted, and for medicinal purposes, if needed, a small quantity of rum and spirits of ammonia and a few pills were added.

The details of the journey, told us in simple, touching words by Frederick on his return, were substantially as follows:

The temperature was −8 (−22.2° C.) when they started. On

Sergeant Julius R. Frederick.
[*From a Photograph.*]

reaching the summit of the island, where the sledge awaited them, a heavy gale was experienced. The descent into Rosse Bay was made through much deep snow, and the enfeebled men frequently pitched headlong into a drift, from which they always emerged breathless and exhausted. At last the ice in the bay was reached; but, contrary to their hopes, the wind increased and drifting snow filled the air. Struggling on as long

as they could, they were finally compelled, about 8 A.M. of the 7th, to camp.

The high wind and blinding snow rendered the lighting of the lamp for tea impossible, and so, without drink of any kind, they stretched their sleeping-bag on the ice, and, taking a few ounces of frozen pemmican, crawled into it for rest. They were confined to the bag for twenty-two hours by a violent storm, which buried them completely with snow. About 6 A.M. of the 8th they got out of their bag, but were too cold to cook until they had travelled an hour. A warm meal, with tea, refreshed them very much, as they had been nearly thirty-six hours without drink. About 7 P.M. that evening dark and blustering weather drove them to camp. Their sledge was drawn up between a large iceberg and the face of Alfred Newton glacier. The morning of April 9th broke calm and clear, and an hour's travel brought them to our old camp at Eskimo Point. Being within six miles of the place where the meat had been cached, they decided to drop their sleeping-bag and a portion of their rations, expecting, with their lightened sledge, to reach the meat and return in one march.

Frequently open pools of water around the grounded icebergs caused long detours. At times the tidal overflow wet their feet, and their foot-gear froze solid the instant they touched dry ice. To add to their misfortunes, about 11 A.M. a strong northwest gale sprang up, with drifting snow, which tended to chill and exhaust them. In a short time they were unable to see any considerable distance. Struggling on, by 3 P.M. they had reached the place where the meat had been abandoned; but, notwithstanding a very careful and extended search, they were unable to find any traces of it. No signs of their old sledge-tracks could be seen, and from the appearance of the place they inclined to the conclusion that the ice had

broken up and moved out since their last trip the preceding autumn. Frederick at this juncture proposed that they return to their sleeping-bag, and resume the search on the morrow. Rice favored remaining, hoping it would soon clear and that the meat would be found. About 4 P.M. Frederick noticed indications of weakness in Rice, and reminded him of their mutual agreement to give timely warning of approaching exhaustion so as to avert disaster. Rice said that if they travelled a little slowly he would soon be rested, but in a short time he showed such signs of exhaustion that Frederick called a halt, and gave him a quantity of spirits of ammonia in rum until some tea could be cooked. After warm food and drink, Frederick in vain urged him to start to avoid freezing. His condition had now become alarming. He was too weak to stand up, and his mind continually reverted to home, relatives, and friends, and to the pleasures of the table in which he intended to indulge on his return. At the same time he appeared to realize his critical condition, and gave detailed instructions regarding his manuscripts and personal effects.

In the meantime Frederick did all possible for him. Although a driving storm of wind and snow, with a temperature of 2° (−16.7° C.), as shown by our camp records, prevailed, he stripped himself of his *temiak* (jumper), in which to wrap poor Rice's feet. In his shirt-sleeves, sitting on the sledge, he held his dying comrade in his arms until a quarter of eight, when Rice passed away. Save the last half hour, this time was enlivened, as far as it could be, by cheerful jocoseness and lively remarks, in which Rice and Frederick had always indulged. It must not be thought a mockery, for death had been looked so long in the face that he had no terror for most of the party, and killing the present by distracting the mind had become a second nature to many of us. Frederick's condition may be

THE DEATH OF RICE—BAIRD INLET, APRIL, 1884.

more readily imagined than described. Starved by slow degrees for months, weakened by his severe and exhausting labors, chilled nearly to numbness, he was alone on an extended ice-field with his dead comrade. His sleeping-bag was miles from him, and to reach it he must struggle against a cutting blast filled with drifting snow. Such a march might well daunt the strong and hearty, but to that weak, starving man it must have seemed torture and destruction. For a moment, he said, he thought he must lie down and die; it was the easiest thing to do. But then came to him the recollection of his starving comrades, who awaited his return with eagerness and hope. If he came not, some of those behind, he well knew, would venture forth and risk their lives to learn tidings or bring succor. Thus thinking he turned away from the dead to return to us, the living.

He reached Eskimo Point and his sleeping-bag too weak to open it until he had laid down a while and revived himself by a mixture of ammonia and rum. Recovering strength and vitality by sleep and a little food, he was unwilling to return to us until he had buried Rice, and to cover his comrade with snow and ice he walked ten or twelve miles over the floe.

Frederick's return to us was a marvel of forethought, energy, and endurance. Dragging his sledge as far each march as his feebleness would permit, he took a little food, and getting into his bag drank a spoonful of ammonia and rum, which enabled him to sleep. As soon as he awoke, benumbed and stiff, he immediately got out of his bag, travelled on until he was thoroughly warmed up, then prepared tea and food, and marched on as far as possible. In this way he managed to bring back to us everything hauled out; and, astonishing to say, he turned in Rice's rations, having done this work on the food allotted.

The mourning over Rice's death was deep and prolonged,

for it was felt that he had died for us, as his strength, if not wasted in that journey, would undoubtedly have brought him through to the end. He was a clever, cultivated, and amiable man, who had endeared himself to his comrades, and distinguished himself in the field and during the retreat. His willingness to ever venture his life for his comrades was evidenced by his extraordinary trips to Isabella, Sabine, toward Littleton Island, and, last, by this fateful journey.

One man broke down completely, giving way to sobs and groans which were most dismal to our ears. The party with one consent berated him soundly for this exhibition of feeling, glad, I thought then and think now, of some action which would divert attention from themselves and prevent others from seeing how keenly this death affected each one of us.

The condition of affairs had changed much during Frederick's absence. Lieutenant Lockwood's condition after Christiansen's death alarmed me very much, and on April 6th I commenced issuing him extra food—four ounces daily of raw dovekie, all and really more than we could well spare. He seemed better on the 7th, but Lynn's death affected him very seriously, and he said that he wished it was over with him. The last words he wrote were on that day: "Jewell is much weaker to-day." On the 8th he fainted, and his mind wandered much during the evening, but never unpleasantly so. He became unconscious at 4 A.M. of the 9th, and died twelve hours later, calmly and peacefully, without suffering, as passed away all of our party.

Lieutenant Lockwood was a gallant officer, a brave, true, and loyal man. Christian charity, manliness, and gentleness were the salient points of his character; of a modest and retiring nature, he did not make friends quickly, but his personal qualities invariably commanded respect. Slow to form or advance an opinion, he decided wisely, and bent his best energies

to the accomplishment of his duties; and to those qualities, and not to good fortune, must be attributed his great successes. He always did his best, and that best will give him a name in Arctic history as long as courage, perseverance, and success shall seem worthy of man's praise and ambition.

On Lieutenant Lockwood's death I felt it obligatory to order Lieutenant Kislingbury to duty with the expedition; a step which had not been taken, first, because Lieutenant Kislingbury had never requested it, and, secondly, in case of my death his return would have thrown the command on him to the detriment of Lieutenant Lockwood, who had labored hard and successfully on all occasions. I complimented Lieutenant Kislingbury highly on his labors the preceding autumn, when he had spared neither strength nor exposure to collect our scattered supplies, and had overworked and seriously strained himself.

Jewell failed after Lockwood's death, and, despite extra food, four ounces daily, died on the 12th, becoming unconscious in my arms. I fed him for several days before his death, and labored assiduously to inspire him with new courage and vigor. He was an excellent man, and had been a most efficient and conscientious observer. He had also performed extraordinary field service considering his slight physique.

On Easter Sunday we heard on our roof a snow-bird chirping loudly—the first harbinger of spring. All noise stopped as by magic, and no word was said until the little bird passed. His coming on that Sabbath morn was thought a good omen, and did much to cheer us through the day. Frederick heard a snow-bird the same day in Rice Strait.

On Rice's departure Salor had attempted the work of catching shrimps, but, breaking down, had been relieved by Brainard, who was very successful, bringing in from twenty to thirty pounds daily, thus enabling us, with a few ounces of meat, to

keep body and soul together. On the 11th Brainard fell breathless in the passage-way, calling out "A bear, a bear!"

He had seen one coming up the ice-foot, and, being unarmed, returned as rapidly as his feebleness would permit to the hut. Lieutenant Kislingbury, Long, and Jens immediately started in pursuit, but Kislingbury returned exhausted after going some two hundred yards. Long and Jens proceeded cautiously; but the bear, catching sight of them, turned and made for the open water nearly two miles distant. The hunters wisely divided, one travelling a little south and the other a little north of the route taken by the bear. The rough ice favored them, and as the animal stopped occasionally they got within rifle-shot before it reached the water. Both fired within a few seconds of each other from a distance of two hundred and fifty yards. Jens, confident of himself, fired first, with gloved hands, striking the bear in the fore-paw. Long, appreciating the critical situation, as the bear was within a dozen yards of the open sea, took time to unglove his hand and uncover his head so as to render his shot certain. Ten seconds later he put a ball through the animal's head, but, to insure his death, both men fired again after he fell. The bear proved to be a young one, weighing about four hundred pounds dressed. This game seemed to insure our future. Jens received an allowance of rum and tobacco, while as a reward for Long's coolness and skill he was conditionally promoted to be sergeant.*

The day following Long shot a small seal (*Phoca hispida*) weighing sixty pounds, which Jens secured with his kayak, and the latter hunter saw a white whale.

---

* Long, with Frederick and Brainard, were assigned by me to the Signal Corps, subject to the approval of the Secretary of War. It not being possible for the Secretary to sanction my orders, as of that date, the men were later transferred on my formal request approved by the Chief Signal Officer.

LONG AND JENS KILLING THE BEAR—APRIL 11, 1881.

On April 13th I increased the ration of the party to a pound of meat daily, which with the shrimps improved us generally; eight ounces extra meat daily were also issued to Elison and to the hunters, Long, Jens, and Brainard.

On April 14th my journal says: "Lieutenant Kislingbury shows very decided mental derangement, and the doctor informs me that my heart is in a very dangerous condition; four ounces extra pemmican and two ounces of bread issued to me."

I had been previously urged by a number of the party to issue myself extra allowances, such as had been granted to various other members of the party when the occasion seemed to demand it, but I had not been willing to do so. The death of Lieutenant Lockwood and the mental incapacity of Lieutenant Kislingbury materially changed the condition of affairs when my death seemed imminent. If I should die, Sergeant Brainard would be my legal successor, as Dr. Pavy, who had refused to renew his contract the preceding July, became a civilian the moment he was relieved from arrest; but he was not a man to accept such a status quietly, and his misconduct was still more evident as time passed. I therefore wrote a letter transferring the command in such case to Sergeant Brainard.

My journal, April 15th, says:

"Bierderbick made oath to-day about the truthfulness of his statements charging Dr. Pavy with taking Elison's bread, last autumn, and appropriating to his own use four cans of extract of beef.

"Lieutenant Kislingbury is now occupying the mattress by the side of Bierderbick, since it was made vacant by Lieutenant Lockwood's death. His mind is considerably affected, and he talks at times like an infant. He frequently asserts his intention of going out and doing all kinds of work, but he is in such physical condition that he can scarcely walk; and in con-

sequence I have forbidden him to attempt labor of any kind, without positive instructions from me. In his present state any tax on his physical strength would be at once fatal. Ellis is somewhat better, but is very weak-minded. Gardiner is ailing again, and I was obliged to give him a half gill extra of rum to-day. The doctor says that he will be the next one to die."

"April 16th.—Brainard made two trips for shrimps to-day, and got forty pounds. He was entirely exhausted on his return from the second trip. His devotion to the welfare of the party is astonishing. Felt obliged to relieve Ralston to-day as cook, as some of the party are satisfied that he has not fairly divided the food. This is the first time there has been any complaint on that score in our mess. Six ounces extra of food were issued me to-day. Israel is to have eight ounces extra meat for the present."

"April 18th.—Long unable to hunt owing to continued bad weather. The doctor made a detailed report of the health of the party to-day. He says that the following are in a very bad way: Lieutenant Kislingbury, Israel, Salor, Bierderbick, Gardiner, and Connell, and that Whisler is quite weak. He thinks that I am improving very slowly, and in consequence of this report no extra allowance of food was issued me."

"April 19th.—Long detected Dr. Pavy this morning drinking part of Schneider's allowance of rum. The doctor to-day complained very bitterly to me of Elison's ingratitude to him for the kindness and attention he has shown him. I cannot blame Elison for giving vent occasionally to his feelings, as he has long realized the part the doctor has played toward him. Bierderbick and Ellis were much worse to-day, being unable to eat the shrimps. It worries me a great deal, for if one cannot eat them he must certainly die soon. We have a large quantity of shrimps on hand, and this evening I gave the party the

option of eating as many as they could cold. No one was able to manage more than a few ounces."

"April 20th.—Israel had the last eight ounces of extra meat this morning, and no extras are now issued, except to Elison and the hunters. The doctor says that no increase can be allowed on his recommendation, unless it is given to Lieutenant Kislingbury, Ellis, Bierderbick, Gardiner, and Israel. It is impossible to give extra food to so many, and so I give it to none. As no game has been obtained this week, I ordered that the ration to-morrow be reduced from one pound to ten ounces."

"April 22d.—Dr. Pavy and Lieutentant Kislingbury recommended me to-day to increase the daily allowance of meat to one pound. That would mean that our entire stock of meat would give out on May 7th. I told them that I could not consent to their recommendation, but finally agreed to some change, and ordered an increase to twelve ounces daily to begin on the 24th. My heart troubles me, and my end seems near. I gave to-day detailed instructions to Brainard as to my wishes regarding my effects, and the course which is to be pursued in case of my death. The letter remains in writing that he shall assume command in case of my perishing, as Lieutenant Kislingbury is unable either mentally or physically to do so. This evening Schneider broke down morally, if I may use the word, and refused to obey my orders to prepare supper. The doctor reported him well, yet Schneider said he could not do it; in consequence of his refusal, I left my bag and took his place as cook for the other mess, despite the entreaties and remonstrances of the enlisted men of the party. I said, however, that when affairs came to such a state that the commanding officer of a military party could not enforce his orders, it became incumbent upon him to perform the neglected duties himself, and not allow his inability to compel obedience to

interfere to the detriment of others. Jens, however, came forward and attended to the cooking and serving out of the tea. Schneider seemed to be in a better frame of mind after eating his supper. Long had an idea of going to Rice Strait to-morrow, and I at one time so decided; but finally, on Frederick's representations as to the distance, state of travel, etc., decided to give the hunting-ground toward Sabine further trial until next Monday. Israel had a wretched afternoon, suffering much from weakness and pain. The party generally are in very poor spirits."

"April 23d.—Schneider cooking again. I told him yesterday that if he did not cook the breakfast he could have none; that if he could not work here he could not eat here. I pity the man's condition, but deem it necessary that he should cook. I plead with him as a man, as a soldier, and as a German, but for a long time in vain. Bender and Henry to-day tore out the inside of the boat, and Ralston carried out six tubs of ice which had formed on the inside of the boat during the winter. Ralston's toe is in a very bad condition, but yet he is willing to do what he can. We used the last of the stearine for cooking this evening, and begin on the boat in the morning. We have yet seven gallons of alcohol, but I think it better to use it as food to eke out our remaining rations, of which we have about three hundred and thirty pounds. Our chances are still fair of getting through, but more good men may yet fall before plenty and safety come to us. Bierderbick is a little better, and so are Kislingbury, Whisler, Bender, Connell, and Salor. Brainard and Elison are exceedingly well, and Dr. Pavy manages to hold his own. The old stove has burned out, and Bender made a new one to-day. The teapot unfortunately upset this morning, and consequently there was a short allowance of that beverage. Ralston, by my orders, commenced feeding

Elison this morning, as Dr. Pavy requested to be relieved from it; giving, as a reason, the effect of the smoke upon his eyes. Elison reported to me this morning that Dr. Pavy, while feeding him last evening, stole part of his bacon, taking and dropping pieces into the sleeping-bag. He requested me to make a note of this fact. Ralston spilled his stew this morning, as did Schneider his tea; but others contributed to replace that which was lost. It is gratifying to note that when any one has lost their food or drink by accident, that some of the party have invariably contributed their mite to replace it. Schneider cleared the snow from the top of the boat this morning, which improved the condition of things by admitting the light; and, as I hope, partly stopping the fearful drip from the roof upon us, which commenced this morning during the cooking. The doctor thinks an increase needed for Israel and Gardiner, and I have ordered four ounces of meat for each, commencing to-morrow. Ellis is better; I am in about the same condition. My heart gives me some anxiety. The doctor to-day promised me, on his word of honor, that he would advise me of any pressing danger in my case several days in advance, so that I can arrange matters for the future of the party. This morning, in a very general way, I impressed upon the men the importance of pluck and unity in case anything should happen to me, and that they should not lose heart in any event. I told Israel and Elison what I wanted done with my papers, so that three are now advised regarding my effects and ideas in case anything sudden does occur to me. I deem such measures necessary precautions. On Dr. Pavy's recommendation, and in a measure owing to his statement that remarks have been made by some of the men regarding the extra eight ounces of meat given Brainard for shrimp-hunting, I have decided to try Dr. Pavy's plan, and do the work without any extra allowance and through

the strongest of the party. Under this plan Dr. Pavy goes to-morrow early to set the shrimp-net. Long and Jens hunting, but had no success and saw no game."

"April 24th.—I called Dr. Pavy at 4 A.M., and he went down to set the shrimp-nets. Sergeant Brainard went at 8 A.M. to draw the nets, and found only about four ounces; the doctor had arranged everything in such an ingenious way that the shrimps could not get into the bags. He admitted afterward that he was thinking of something else at the time. I had a terrible attack of illness this morning, losing much blood and experiencing great pain, with resulting physical weakness. Was obliged to receive four ounces extra pemmican. A number of the party, speaking of the issue, said that they had long urged on Sergeant Brainard the importance of issuing regularly to me an extra amount. I told them I could not take it except in case of extreme sickness. Bender relieved Schneider as cook, so that the latter could help Brainard. Schneider went down this afternoon and made a draw of about ten pounds of shrimps, but lost two pounds by a fall; Brainard went later and got twelve pounds; Schneider is to go in the morning. Dr. Pavy ordered alcohol issued this morning to Long and Jens while I was out of the hut, a dangerous and unwarranted assumption of authority on his part. I countermanded this order, as he had been trying to obtain this issue by request, and I had three times refused it on the ground, which has been borne out by our past experience, that the issue of alcohol *in the morning* is not the proper thing, especially to men who are hunting for our lives. Long was later given half a gill by the doctor's prescription, on account of sickness. Four ounces of extra meat were issued to Israel and Gardiner."

"April 25th.—Took a half grain of chloride of mercury; am suffering terribly yet. The doctor reports the party as in

about the same condition as yesterday. The four ounces extra meat for Gardiner and myself continues. The eight ounces of meat for the shrimp-hunters begins again to-morrow. The doctor unites in recommending it, admitting that his plan of doing the work is a complete failure. Schneider was down at 2 P.M. and got ten pounds, but returned broken down physically. He left the nets so suspended that Brainard caught only four pounds in a visit later. As a result of this change of plan we have probably lost from thirty to forty pounds of shrimps, have broken down Schneider, and saved only two ounces of meat to each man. Brainard was fortunate enough to shoot two ptarmigans—the first birds for many a day. Lieutenant Kislingbury recommended the successive issue of bacon, pemmican, and seal on successive days; but later said he desired to do exactly as I wished in the matter. Commenced this morning, in deference to Dr. Pavy's reiterated medical opinion, to issue half a gill of diluted alcohol to the hunters, although I do not think it best myself. It is given before breakfast instead of after. Had a two-pot shrimp stew this morning. Storm last night, which continued this morning and prevented hunting."

"April 26th.—A bad day for hunting; Long saw but one seal. The party generally are in poor spirits. Brainard was too much run down by previous work to enable him to go for shrimps again this afternoon, and his trip was taken by Frederick, who got about seven pounds. Brainard is working far too hard, and if he should break down we certainly would be in a very bad way. Am taking a grain of mild chloride of mercury a day. Suffered much pain, and in consequence am depressed in spirits and physically very weak. My bowels seem to have completely lost their power. Connell is similarly troubled.

"Jens fired at an oosuk (*Phoca barbata*) at very short range (some forty yards) from behind the screen on the ice and missed

him. This morning I ordered four ounces extra pemmican for the hunters. Later Dr. Pavy submitted two written reports, dated the 25th and 27th. On the 25th he recommended that Brainard have only four ounces of meat instead of eight, which is in direct contradiction to his verbal recommendation. To-day he recommends a general increase of one ounce, which I have refused; but have decided to alternately issue American and English pemmican and bacon, but to save fuel have cut off one of the morning pots of stew. By this arrangement we have in the morning, cold, four ounces of bacon or pemmican, and, hot, one ounce of blubber and one ounce of meat, with shrimps; and in the evening six ounces of meat, with shrimps, but no tallow. Private Henry * took advantage of my illness and of others being down in their bags this morning to mix the "moonshine," and drank extra alcohol to such an extent as to become helplessly drunk. His condition was discovered by Lieutenant Kislingbury, who was next to him. The disgust of every one at such baseness is excessive. Yesterday Long saw about a dozen white whales, which were travelling from the north; they unfortunately did not come within shooting distance."

"April 28th.—Succeeded in cheering up Jens to-day. He has been very gloomy and despondent over his late misfortune in missing the seal. Everything has been done by the members of the party to encourage him, but it is evident he is losing his grip; however, he went out with Long in very good spirits.

* I should have preferred throughout this work to have omitted names in each case, when noting thefts of food and other lapses from good behavior at Sabine, believing even at that time, and being much more impressed with it now, that rigorous judgment should not be meted out to men so hardly situated. Such a course, however, was rendered impossible by the publicity given to various diaries, and the exaggerated stories growing out of them, shortly after the return of the expedition.

THE DEATH OF JENS.

Connell and Bierderbick have improved very much. Israel received four ounces extra meat, and Gardiner also; that of the latter goes to Bierderbick to-morrow, but Israel's continues.

"April 29th.—A fatal day for us. Breakfast at 5 A.M., instead of 6, for accommodation of the hunters. Jens and Long got away at 6.45 A.M. in excellent spirits. Jens appeared to be in particularly good humor; and for the first time in many weeks came and shook hands with me before he left, laughing pleasantly during the while. At 2.30 P.M. Long returned, and reported that Jens was drowned at 11.30 A.M., losing the kayak and our only reliable rifle, the army Springfield. Every one grieves very much over the 'Little Man's' death, not alone on account of the critical condition in which we are left as regards food, but on account of the strong affection we all had for his great heart, unvarying truthfulness and integrity. Long said they had been watching an oosuk on a floe which was separated from the fast ice, in the hope that the floe would drift in, but after a long delay Jens concluded to try and reach the seal, and started over the first pool of water in his kayak, taking a screen so as to crawl up on the oosuk. He crossed the first lead all right; and dragged his kayak up, and pushing it into the second lead, started across. It is possible that the kayak was cut by the new ice, as in the middle of the second pool Long observed that he suddenly commenced paddling very rapidly, and the rear of the kayak appeared to be inclined upward. Jens made an effort to jump with the kayak on the ice, which unfortunately was new and unable to bear his weight. The kayak remained in sight for an hour or two, during which time Long, at great personal danger, succeeded in getting within a foot of the body; but was compelled to retreat, after twice breaking through the young ice, by the drift of the floe, which, having touched the fast ice, was being separated from it by the tide.

Long said that Jens was dead when he first came near to him, and that the kayak was filled with water."

Jens Edward, though an Eskimo, was a man and a Christian of whom no evil word was ever spoken, and on whom no shadow of fault rested in his three years' life with us. Of his conduct on a critical occasion (April 11th) Brainard writes: "The floe on which Long was standing broke from the main ice and drifted out to sea. Jens from a distance, discovering Long's situation, paddled out to him in the kayak. Long urged him in vain to return to the fast ice and save himself. The faithful fellow doggedly refused to go, and said in his simple way: 'You go, me go too!' Fortunately the turning tide wafted their ice-raft to the fast ice."

"April 30th.—The death of Jens did not seem to affect the spirits of the party last evening, but to-day they are as a whole much depressed. Lieutenant Kislingbury is in a particularly gloomy state.

CHAPTER XLIX.

THE LAST OF OUR RATIONS.

MAY opened dismally, with a snow-storm. Brainard continued indefatigably his work of catching shrimps, of which he brought in no less than four hundred and fifty pounds from April 8th to 30th. On May 3d, however, our last bread was gone, and but nine days' meat remained, even at the small ration then issued. Every one favored, for once, a reduction to the minimum. Our hunters kept the field daily but saw little game. On the 3d Long visited Rice Strait and killed a seal, which, drifting toward him, sank within ten feet of him.

In the early days of May I was very ill, and expected hourly to pass away. When I was in the worst condition Whisler was detected by Bender and Henry with bacon from the storehouse. The three men were outside, and Whisler claimed that the door was forced by the others, and he, passing by, saw the food, and was too ravenous to resist. Bender and Henry said that Whisler forced the door, and they detected him. I was too sick to do much in the matter. The entire party expressed themselves in the harshest manner, and Whisler, pleading guilty to having been unable to resist the temptation to take the food, announced himself ready to pay any penalty. Henry, who was on parole, joined in the cry.

"May 6th.—A violent storm commenced at three o'clock this morning, and gradually abated, dying away at noon. Dr. Pavy made trouble to-day by false statements on three dif-

ferent points, as regards his reports made daily to me in French, and an acrid discussion followed. I ordered him four times to drop the matter, and finally told him were he not the doctor I would kill him. As a consequence Private Bender attempted to defend the doctor, and, despite repeated orders, would not be quiet. A mutiny seemed imminent and I would have killed him could I have got Long's gun. Things have come to such a point that my orders, by these two men, are considered as binding or not at their pleasure. I fear for the future."

This entry is given as it was written by me at the time. I was then suffering greatly from the only serious illness of my three years' absence, and I doubt not now but that my mental condition was irritable, and perhaps unsound; but, looking back at the affair, I cannot think otherwise than that my decision was just and proper under the circumstances. When reiterated orders given by a commanding officer of a party in such extremities are not obeyed, it is evident that all bonds of discipline are at an end, and that threats and force to insure obedience are fully justifiable.

"May 7th.—A high wind all night. Spent nearly all day in getting my personal effects in order, so as to insure their preservation in case of my death. I have pinned to most of the few little articles which I have, a paper setting forth that they are my property, and what has been their history. Others of the party are engaged in a similar manner, although they are all in good spirits. The storm being too violent for hunting, Frederick and Long cut out a part of the boat and covered the aperture with canvas."

"May 9th.—Frederick was back from hunting at 1 A.M. He reports having seen a school of twelve white whales and many seals, but unfortunately all of them were in open water.

I wrote out wills to-day for Whisler and Salor. The party appear generally stronger. Israel's extra allowance of four ounces of meat stops to-morrow."

"May 10th.—An exceedingly cold morning, the temperature standing at zero (−17.8° C.) at 1 A.M., at which time Frederick returned from a nine hours' hunt. He saw four seals and a white whale. The channel is entirely clear of ice, as indeed it has been for several days. It is positive that there is no party at Littleton Island, or we should have seen some one here from there by boat ere this. Long was out all day, but saw no seals. The ice was very rotten and dangerous, and he broke through in several places. The party somewhat improved in condition."

"May 11th.—The temperature at 2 A.M., when Frederick returned from hunting, was −4° (−20° C.), an extremely low one for this time of the year. Frederick succeeded in killing an oosuk seal in a water-pool, but unfortunately he sank instead of floating into the fast ice. The temperature at noon in the sun was 37° (2.8° C.). The party are in much better spirits than for some time. It seems strange that it should be so, as we have, after to-morrow, but two or perhaps two and a half days' rations."

"May 12th.—Frederick back about 1 A.M., having seen only a seal and a (burgomaster?) gull. Long out all day, but saw no game. Consulting with Brainard to-day, I decided that it would be best to divide the last of our regular rations, which will last until noon of the 15th, with a small quantity of tallow for the afternoon stew of that day. I thought it best to pursue this course and remove one source of uneasiness, as it was barely possible that one or two of the worst men of the party might break in and appropriate the remaining food, hoping thus to save themselves at the expense of the others."

"May 14th.—Brainard got shrimps and kelp as usual. Dis-

covered to-day that about five ounces of Elison's bacon has been taken by some unknown person. A couple of days since an ounce of Long's lunch was stolen. Extremity is demoralizing some of the party, but I have urged on them that we should die like men, and not as brutes: Elison's spirits are wonderfully high. He now lives on the same ration as the rest of us. He thanked me most touchingly for the consideration he thinks I have shown him, which is only the poor fellow's due. Dr. Pavy says that he will outlive all of us."

"May 15th.—Long suffered so much from weakness that he was compelled to return early from hunting. The party are all very weak, but continue in good spirits. The sea-kelp and shrimps form our only food from to-day, until we are driven to eating the seal-skins."

"May 17th.—Ordered Bierderbick to divide up all the remaining lard which had been saved for medicinal purposes. He divided it as accurately as possible, each person getting about three ounces. Dr. Pavy, however, objected both to disposition and division."

"May 18th.—Very stormy last night and this morning. I heard a raven croaking this morning and called Long, who succeeded in killing him. Gave Long the liver, and concluded to use the bird for shrimp-bait, thinking we could obtain more from him that way than in eating. A violent storm kept everybody in the hut to-day except Brainard, who went for shrimps. Ellis very weak to-day. Bender treated him brutally, so that even Henry rebuked him. I reprimanded Bender sharply for his lack of feeling, although he is probably somewhat insane and not entirely responsible."

Ralston says: "Tried a feed on saxifrage (*Saxifraga oppositifolia*); it is beginning to show green on the ends. I am going to keep up hope as long as I am able to walk, although

my feet are in horrible condition. We are only praying for one small seal. A few snow-buntings now seen every day. Psalms and prayers read by the commanding officer."

"May 19th.—Frederick going out to get ice to cook breakfast this morning returned immediately, reporting that as he emerged from the passageway he saw a bear within a few yards of the house. Long and Frederick dressed for the hunt, and started after the bear, but returned about 10.30 A.M., having been unable even to get a shot at him. Their weakened condition was such that the bear easily outstripped them. Our agony of hope and fear while the hunters were absent cannot be adequately expressed by language. The last alcohol issued to-day, except a few ounces for medical purposes which the doctor will prescribe. Israel and Whisler have quite broken down, and the whole party is in lower spirits than ever before. Private Ellis died at 10.15 A.M." Ellis was a strong, active man, capable at times of great endurance.

"May 20th.—Ellis buried at noon to-day; the first death from starvation in six weeks. The day was too stormy for hunting, but Brainard managed to obtain shrimps as usual. The party are decidedly weaker. In order to give Israel the last chance, and on Dr. Pavy's recommendation, four ounces of the raven was given him to-day, that being our only meat."

"May 21st.—A saxifrage seen in blossom.* We are now mixing saxifrage in our stews; fully nineteen-twentieths of it is the dead plant, with but the faintest tinge of green at the ends. My appetite and health continue good. It is evident that I shall die, as have the others, of lack of food, which induces dropsy of the heart. Lieutenant Kislingbury and Ralston are very weak.

* This plant (*saxifraga oppositifolia*) was in a very sheltered place, and is probably the earliest ever seen in blossom in such a high latitude, 78° 50′ N.

Dr. Pavy is working wonderfully hard getting ice for water, and, strange to say, is making a collection of stones covered with lichens. His strength and energy lately are quite surprising, I am glad to write something good of him."

Later I learned from Sergeant Israel that Dr. Pavy had persuaded him to copy a certificate written by the doctor as to his professional services, and that during my absence from the hut it had been circulated for signatures. The writing of the certificate was followed that evening by a recommendation from Dr. Pavy to give Israel our last meat.

"May 22d.—It is now eight days since the last regular food was issued. It is astonishing to me how the party holds out. I have been obliged to feed Ralston for a couple of days past. About 2 P.M. he succeeded in eating a part of his dinner, but the rest he could not force down. When tea came, about 3.30 P.M., I asked him if he wanted it, and he said yes. I raised him up, but he became unconscious in my arms, and was unable to drink it. The strength of the party has been devoted to-day to pitching the wall-tent some three hundred yards southeast of the present hut, on a level, gravelly spot in the sun's rays. The doctor says that the party will all die in a few days without we succeed in moving from this wretched hut. The melting snow rains down such a quantity of water upon us that we are saturated to the skin and are in a wretched condition."

"May 23d.—Ralston died about 1 A.M. Israel left the bag before his death, but I remained until driven out about 5 A.M., chilled through by contact with the dead. I read the burial service over him, and ordered him to be buried in the ice-foot northwest of the camp, if the party were unable to haul him to the hill. The weakest of the party moved to the tent upon the hill this afternoon. Whisler managed to get up the hill alone; he became weaker, however, in the afternoon, and is uncon-

scious this evening. Israel was able to walk half way, but the strongest had to haul him the rest of the distance. I. succeeded in getting to the tent with great difficulty, carrying the afghan in which I have been sleeping, using it as an inner bag.

The barometer was broken in removing it to the hill—a great misfortune, as I had hoped to continue the observations until the last man died. We have made these observations regularly, with few or no breaks, until the present month, when the rapidly diminishing strength of the party compelled a discontinuance of certain of them.* Long hunting to-day saw a gull (long-tailed skua). Brainard got only ten pounds of shrimps; less by far than we are eating. It is a sad state of affairs, and the end must be near."

Ralston was an excellent observer and an efficient man in the field, with whom I never found a shadow of fault until his last days at Sabine.

"May 24th.—The tent is much more comfortable. The temperature reached 39° (3.9° C.) inside it this morning. Whisler unconscious this morning, and died about noon. I read the service over him, and he was left outside near the tent, where he had died, for the present. Ralston buried this morning on the hill, I believe. The last issue of rum was made to-day, and a gill or so remains for medical purposes. Israel is exceedingly weak; he realizes that his end is near and is reconciled. Frederick and Long worked hard to complete the change of camp. For dinner we had a handful of saxifrage, two or three spoons-

* The *approximate* means of pressure and temperature deduced from these readings were, in 1883: October, 30.03; 1° (−17.2° C.). November, 29.92; −18.2° (−27.9° C.). December, 29.88; −21.8° (−29.9° C.). In 1884: January, 29.83; −28.1° (−33.4° C.). February, 29.70; −21.4° (−29.7° C.). March, 29.81; −20.2° (−29° C.). April, 30.13; −2° (−18.9° C.). May, 30.16; 18° (−7.8° C.). June . . . . ; 33.6° (0.9° C.).

ful of shrimps, and a pint and a half of tea. Schneider was guilty of abusive language to Whisler yesterday when he was dying; the second case of this kind. I gave him a severe reprimand, and asked him whether he had any humanity or not. Dr. Pavy, Brainard, Long, Henry, Salor, and Frederick, the strongest of the party, are yet quartered in the remains of the

Sergeant David L. Brainard.
[*Sole survivor of those who reached the Furthest North.*]

old hut; taking their meals, however, with us at the tent. We have not enough canvas to cover them all here, as we were unable to get out the tent-flies, which were frozen to the ground in the hut. Frederick and Schneider are trying to construct an addition to the tent out of blankets and old canvas, so that we may all sleep under the same shelter. The sick men complain of Schneider's unfairness in dividing the food, which is

undoubtedly true. Frederick, ordered to watch him, reports that he is unfairly dividing our wretched shrimps, giving equal soup but keeping too great a portion of shrimps, and I ordered him relieved as cook. It is wretched. Of the party, at present seven are helpless. Brainard is breaking himself down getting our shrimps. A violent storm again last night, which is not very bad this morning, but still no hunting is possible."

Whisler was a man of fine physique, who had always labored his best to advance the interests of the expedition.

"May 26th.—The storm was so bad this morning that Brainard could not go shrimping, but this afternoon he got eight pounds. Owing to his failure to obtain shrimps, we had a stew last night and this morning of the seal-skin thongs which have been used in lashing together the sledge and for similar purposes. How we live I do not know, unless it is because we are determined to. We all passed an exceedingly wretched night. The stronger of the party succeeded in burying Whisler very early this morning. Israel is now in an exceedingly weak condition, and unable even to sit up in his bag. I am compelled to raise him and feed him, which is a tremendous drain on my physical strength. He talks much of his home and younger days, and seems thoroughly reconciled to go. I gave him a spoonful of rum this morning; he begged for it so exceedingly hard. It was perhaps not fair to the rest to have given it to him, as it was evident it could not benefit him, as he was so near his end. However it was a great comfort and relief to him, and I did by him as I should like to have been done by in such a time. Nobody objected to my action openly, as Israel has always been a great favorite. Long hunting to-day; saw a flock of king-ducks, and succeeded in killing three dovekies, which fell into the water beyond reach. It is a comfort to us that some game has appeared, and that there is a possible chance."

"May 27th.—Long killed a dovekie, which he could not get. Israel died very easily about three o'clock this morning. I gave him yesterday evening the last food he ate. A very unpleasant scene occurred to-day. Dr. Pavy in the afternoon took all the remaining iron from the medicine-chest. I ordered him to return it there, he having been accused to me by Steward Bierderbick, Sergeant Elison, and others of taking large quantities of Dover's powders, and he has lately failed to issue iron to the party as he promised. There was a violent scene, and Lieutenant Kislingbury, as usual, thought Dr. Pavy right. Lieutenant Kislingbury interfered more than I thought proper, and I ordered him to cease criticizing."

Sergeant Israel was a young man of some fortune, a graduate of Ann Arbor University, a promising astronomer, with a future before him. His death affected me seriously, as his cheerful and hopeful words during the long months he was my bag-companion did much to hold up my hands and relieve my overtaxed brain. He had always endeared himself to all by his kindness, consideration, and unvarying equanimity, and was often called at Sabine our Benjamin. His services were very valuable in our scientific work, and despite his weak physique he had sought field service. In reading the burial service I was mindful of him and his people, and omitted every portion which could be distasteful to his coreligionists.

"May 28th.—Long shot two dovekies to-day, but got only one of them. I divided it between him and Brainard, the men who are feeding us at present. Long saw king and eider ducks, but they were not near enough for a shot, being too shy. The men this evening are in very good spirits: however they all believe and say that we have no chance of surviving."

"May 29th.—Brainard returned exhausted and half frozen from his shrimping trip, and was obliged to sleep outside the

tent in the storm, as Dr. Pavy and Salor, who are in Brainard's bag, crowded him out, refusing to make room for him inside. Brainard took the matter very quietly, although in his weak condition he suffered greatly from cold and exposure."

"May 31st.—A violent southerly storm set in at midnight, and lasted twenty-four hours, keeping everybody in their bags. The wind must have reached a velocity of fifty miles per hour at times, and averaged at least thirty miles per hour for six or seven consecutive hours. These long stretches without food or water are very exhausting to us."

Brainard, commenting on the conflicting feelings at first engendered by the sight of his comrades' graves passed daily, says: "But later my own wretched circumstances served to counteract these feelings, and I can pass and repass the place without emotion and almost with indifference."

"May 30th.—Snowing this morning. Succeeded in getting some food warmed, it being the only food or drink for twenty-eight hours. Brainard got very few shrimps to-day. He saw, however, some geese. A great deal of conversation took place regarding Decoration Day, and what was being done in the world from which we are cut off."

In these days thought was an effort, save when I was irritated by some unpleasant occurrence, or important event, into unusual energy, and writing a great labor; so that the contents of my journal became at times exceedingly meagre.

CHAPTER L.

THE END—BY DEATH AND BY RESCUE.

SUMMER opened wretchedly, with a howling gale and driving snow, and a temperature near the freezing-point. For a day and a half an unbroken fast depleted our little strength. We were yet fourteen in number, but it was evident that all must soon pass away, unless our hunters were more fortunate or relief came speedily. My journal continues:

"Long saw to-day a flock of long-tailed ducks. Had breakfast this morning of shrimps and sea-weed, after a fast of thirty-four hours without either food or drink. Everybody very wretched, not only from the lack of food, but from the cold, to which we are very sensitive. Lieutenant Kislingbury, who was exceedingly weak in the morning at breakfast, became unconscious at 9 A.M., and died at 3 P.M. The last thing he did was to sing the Doxology and ask for water. I read the burial service in the afternoon, and the body was moved outside of the tent. The party will try to bury him to-morrow. Long killed a dovekie, which I ordered divided between him and Brainard. In firing at the bird Long was kicked in the face by the gun and blinded, and with difficulty succeeded in reaching the tent. He and Brainard were out seven hours and a half, and Brainard was able to work only about two hours getting shrimps, spending the rest of the time in travelling to and fro. In connection with Lieutenant Kislingbury it should be said, as a

matter of justice to him and me, that during the past six weeks he has been at times out of his head, excitable, and unable to remember. In consequence several unpleasant discussions have occurred between us, and at a misstatement which placed me in a false position I, in a moment of anger and excitement, called him a liar, but later apologized publicly to him and the party. What he said was not so, but I now think his mind and memory must have failed him at that time. We were fully reconciled before his death." I look back on this affront to Lieutenant Kislingbury with a deep and abiding regret that I should have so forgotten what was due to my men and myself as to allow a sense of wrong and irritation to overcome my cooler judgment. A commander should ever be considerate of his subordinates, and that I this time failed in my own weak and irritable condition may be pardoned I trust.

Lieutenant Kislingbury was the only one of my party whom I had known before contemplating Arctic work. He had served under me in building Government telegraph lines, and had expressed a desire to accompany me to the Arctic when I first conceived the idea of going. He was an active, hardworking officer, who had acquired an excellent reputation for frontier and Indian service. The qualities which insured success then, perhaps caused him to chafe under restraints where his work and actions were strictly limited. A successful hunter, a hardy man, he never spared himself in labors which would add to the personal and physical comfort of others. He worked hard and manfully during our boat retreat and subsequent life at Sabine.

"June 2d.—Toinette's birthday. Connell requested me to enter his wish that, in case of his death, his diary should be sent to his late commanding officer as a sign of good-will and respect. The day proved to be a beautiful one. Long shot a

dovekie, which was ordered to be divided between the hunters, and the intestines were to go in the general shrimp stew to give it flavor. Salor is very weak, as is Gardiner. This evening Salor has been somewhat delirious, and I think he will die to-night. Gardiner expressed his earnest desire that his journal, in case of his death, should eventually go to his wife."

"June 3d.—Corporal Salor died this morning about three o'clock. Read the burial service over him. Dr. Pavy is quite weak and unwell, and this afternoon was evidently out of his head. He wanted, among other things, to prescribe calomel for me, although I am in very good condition, and also wanted to mix up and issue all the alcohol left. He prescribed ammonia for himself, and bismuth for Long, which I gave. For a pain in Bender's groin he prescribed iron, and when Connell complained of cold and asked for ammonia the doctor said yes; but I refused it to Connell, as we have but a small quantity, and its issue can be permitted only when really necessary. I am sorry to refuse medicine, but cannot do otherwise unless the necessity is plain. A strong southerly gale prevailed during the whole day, which prevented Long from hunting; Brainard, however, was out and got six or seven pounds of shrimps."

Salor was an honest, reliable, hard-working soldier, and was an energetic and important member of the supporting party toward attaining the Farthest North.

"June 4th.—A strong gale lasted all night, which gave place to a clear, fine, warm day. Dr. Pavy weak to-day, but much better mentally. I had a discussion with him regarding the use of the tripe de Roche, which are to be found in considerable quantities. He has always advised me to refrain from using them, and still continues of the same mind, quoting Richardson,

Franklin, and Hayes, and says it is unhealthy, and nothing but suffering can come from it; that, if any one of the party should be taken with diarrhœa, in their present weak condition, it would certainly be fatal. Brainard, Frederick, Henry, and Bender, however, recommend trial of this lichen. This afternoon concluded to try the tripe de Roche, and ate considerable of it, an ounce or so. The leaves are very dry and have little or no taste, but are evidently nutritious. We had not strength enough to bury Salor, so he was put out of sight in the ice-foot. Long saw four dovekies, two king-ducks, and a large guillemot; he however got but one dovekie, losing the six by the current. I ordered the dovekie to be issued to the hunters, who can barely walk, but Bender begged with tears for his twelfth, which was given him with everybody's contempt. There was a great deal of discussion as to whether he should have it or not. As there seemed to be some feeling over the point after Bender's allowance was given him, I told the party that the hunters must be kept on their feet; and that unless they were sustained, so as to enable them to obtain shrimps, the party much perish at once; that Long could not be expected to hunt without being fed. Henry stealing again from our shrimps. Schneider and Bender also suspected. It will be necessary to take some severe action, or the whole party will perish.

"Our condition grows more horrible every day. No man knows when death is coming, and each has long since faced it unmoved. Each man who has died has passed into the preliminary stages of mental, but never violent, wandering without a suspicion that death has marked him."

Only those who lived knew, and at the first wanderings we looked at each other, conscious that still another was about to pass away. To sleep was perchance to die, and so I never composed my mind for sleep without a strong sense of uncertainty

that ever again should I wake to life and consciousness. This uncertainty of life or death was a veritable sword of Damocles, but far worse than the fable; for with us from day to day the thread snapped and the sword fell upon the heads of our comrades, and day to day we felt the certainty that in a few days—God only knew how many—the same fate awaited us. This constant expectancy of death, at first a sharp, dreadful trial, gradually passed into a vague and deadening feeling, which nevertheless was a terrible mental strain to the end. The easy and painless deaths removed all fear of the agonies of dissolution, which so many dread far beyond the uncertainty as to their future. With us, in those dreadful days, death kindly took away all pain and suffering when he had touched his victim.

"June 5th.—A clear, calm, and fine warm day. I crawled on the rocks to-day, and got a canful of tripe de Roche—half a pint. On some one's recommendation I tried them in my stew, and found their taste very much improved. Some reindeer-moss was also found. Henry troubled with slight diarrhœa from tripe de Roche. Bender made a will. Dr. Pavy very weak and exceedingly flighty. He continually tells us that he is getting stronger and better, but it is evident to everybody that he is in a very bad way. Indeed, however, the whole party are breaking down. Long saw a few birds, but got none. Brainard out several hours this morning, but succeeded in getting only five pounds of shrimps. Henry acknowledged again to me that he had been stealing, and I had a long conversation with him, in which I told him that as he had no conscience he might at least have a little common-sense; that it was evident that if any of the party survived, it must be through unity and fair dealing, otherwise everybody would perish. He promised to deal fairly in the future, and seemed impressed with my caution that he would come to grief if he

did not. I felt doubtful of his sincerity, however, and consequently have given the following written orders:

"'NEAR CAPE SABINE, June 5, 1884.

"'To SERGEANTS BRAINARD, FREDERICK, AND LONG:

"'Private Henry having been repeatedly guilty of stealing the provisions of this party, which is now perishing slowly by starvation, has so far been condoned and pardoned. It is, however, *imperatively ordered* that if this man be detected either eating food of any kind not issued him regularly, or making caches or appropriating any article of provisions, you will at once shoot him and report the matter to me. Any other course would be a fatal leniency, the man being able to overpower any two of our present force.

"'A. W. GREELY,

"'*Lieutenant Fifth Cavalry, U.S.A., and Assistant.*'"

"June 6th.—Fine, warm, clear day. Frederick detected Henry stealing shrimps out of the general mess-pot when his back was turned. Later Henry made two trips to our old winter-quarters, and when returning from the second trip, while passing me, I stopped him and questioned him as to what he had been doing, and what he had with him. After a while he admitted he had taken from there, contrary to positive orders, seal-skin thongs; and, further, that he had in a bundle, concealed somewhere, seal-skin. He was bold in his admissions, and showed neither fear nor contrition. I ordered him shot, giving the order in writing:

"'NEAR CAPE SABINE, June 6, 1884.

"'SERGEANTS BRAINARD, LONG, AND FREDERICK:

"'Notwithstanding promises given by Private C. B. Henry yesterday, he has since, as acknowledged to me, tampered with seal-thongs, if not other food at the old camp. This pertinacity and audacity is the destruction of this party, if not at once

ended. Private Henry will be shot to-day, all care being taken to prevent his injuring any one, as his physical strength is greater than that of any two men. Decide the manner of death by two ball and one blank cartridge. This order is *imperative*, and *absolutely necessary* for *any chance* of life.

"'A. W. GREELY,

"'*First Lieutenant Fifth Cavalry, U.S.A., and Assistant,*

"'*Commanding L. F. B. Expedition.*'

"About two o'clock shots were heard, and later the order was read to the general party. Every one, without exception, acknowledged that Henry's fate was merited. On searching his bundles very considerable quantities of seal-skin were found, as well as a pair of my seal-skin boots which I had loaned to Long a short time since, and which had been stolen from him two nights before. There was found in his pocket a valuable silver chronograph left by me with other scientific instruments at Conger, and stolen by him on our departure. Fully twelve pounds of seal-skin were found cached among his effects."

It is apparent from these records that I had exercised a remarkable, perhaps too lenient, spirit of conciliation and forbearance in the treatment of men who purloined food. No one appreciated more than myself the tremendous strain and determination needful to resist the great temptation of appropriating a morsel of food to satisfy the terrible and continual gnawing at our vitals. As long as we were exempt from death, and food yet remained, I could not bring myself to resort to violent measures. Henry's many offences were condoned up to June 5th, in common with others, with due warning. His execution was regarded by me simply in the light of self-defence for the remnant of my party, and was ordered on my undivided responsibility. A verbal report was made the

moment I met my departmental superiors, several days prior to Henry's burial, and a written report at the earliest moment, before the facts of his death were made public.

The following letter, in answer to my request for a trial or inquiry in this case, completes its history:

"WAR DEPARTMENT, ADJUTANT-GENERAL'S OFFICE,
"WASHINGTON, November 14, 1884.

"LIEUTENANT A. W. GREELY, Fifth Cavalry, Acting Signal Officer, through the Chief Signal Officer, U.S.A.:

"SIR: Referring to your letter dated August 11, 1884, reporting that on June 6, 1884, at Camp Clay, near Cape Sabine, you had ordered the military execution of Private Charles B. Henry, Fifth Cavalry, a member of the expedition under your command, giving the details of the cause of such execution, and asking for the appointment of a court of inquiry in the matter; I have the honor to inform you that, upon consideration of your report, in connection with extracts from the diaries of the several members of the Lady Franklin Bay Expedition, and also in connection with the diary of Private Henry himself, the Secretary of War entertains no doubt of the necessity and the entire propriety of your action in ordering the execution of Private Henry under the circumstances and in the manner set forth in your report.

"The Secretary therefore does not consider that the appointment of a court of inquiry to investigate the matter is required by the public interests.

"Very respectfully, your obedient servant,

"R. C. DRUM,

"*Adjutant-General.*"

My journal continues: "I learned this afternoon from Steward Bierderbick that Dr. Pavy, while at the medicine-chest

yesterday, took away the extract of ergot, and has since drank all in the bottle, about three ounces. Bierderbick says that, after Dr. Pavy left the medicine-chest, he examined it to see what had been taken, but did not notice the absence of the ergot bottle, as it was a medicine for which we had no use. Dr. Pavy is now (5 P.M.) at the point of death, which has doubtless been hastened a day or two by this action on his part. Bender is also dying.

"Later.—Bender died at 5.45 P.M. very easily. I think his death was hastened by Henry's execution. Dr. Pavy died at 6 P.M. His death has evidently been hastened by the narcotics. Bierderbick thought that he believed the ergot to be iron. By all accounts he has dosed himself continually, and to this I ascribe his sudden break-down, as, until the 2d of this month, he was one of the strongest of the party. There are now but nine left. Long killed a dovekie, which I ordered to be divided between the hunters and Frederick. Long saw many ducks to-day. Brainard was out nearly seven hours, and got less than three pounds of shrimps. We must begin on our seal-skin clothing. I got to-day a large quantity of tripe-de Roche lichen, and found them very nutritious; they certainly are very palatable."

Dr. Pavy was a man of fine education, polished manners, and great Arctic ambition. To his credit at Camp Clay must be recorded the restless energy which marked his physical exertions in behalf of the party the last month of his life. His medical skill was great, and contributed much to the general welfare of the party the last winter. His defects and shortcomings have been lightly touched on in my diary. It should be added that his uncertain and changeable moods, and the habits arising from his previous Bohemian life, unfitted him for duty where his actions were subject to restriction or limitation from others.

Bender was an ingenious, hard-working man, who had done good service in various ways both at Conger and in improvising means from scanty material at Sabine.

"June 7th.—I read the burial service over Dr. Pavy and Bender, and their bodies were removed a short distance from the tent. It is not known whether we will have strength enough to bury them on the hill or in the ice-foot; probably the latter. All the shrimps were eaten for breakfast. This is the first time we have been absolutely without a supply of them. Everybody is now collecting reindeer-moss, tripe de Roche, and saxifrage, all of which it is possible for us to eat. The party, however, is so weak that it can do but little. Brainard, Long, Frederick, Bierderbick, and I are the only ones who can get about. Gardiner is very weak, and can live but a few days longer. Schneider also very feeble. Elison's wounds are suffering from his low diet, but he is yet strong. Find, in getting seal-skin together this afternoon, that much is missing. Schneider says that Henry and Bender were eating it, and that he begged them to give him some but they would not. It is thought that Schneider was in the ring, and he is continually twitted by the party."

Henry was the only one who was bold in his thefts, acknowledging them with audacity, and was in the best physical condition of any man in the party. Schneider was in very feeble condition and seemed near death at this time.

It is interesting in this connection to note what Schneider says; I quote from his diary,* which has just come to me:

"Lots of seal-skin and thongs were found on the doctor and Bender both, which showed how dishonest they was. Although

* Schneider's diary, stolen without doubt by a seaman of the relief squadron, was found in a mutilated condition on the banks of the Mississippi River, and was sent to me by Mr. J. A. Ockerson, U.S. Civil Engineer, as these sheets were going to press. It includes from part of June 6 to June 17, 1884.

Henry has told before his death that I had eaten a lot of seal-skin, yet, although I am a dying man, I deny the assertion; I only ate my own boots and a part of an old pair of pants. I feel myself going fast, but I wish that it would go yet faster."

"June 8th.—Clear and calm all day, with temperature ranging from 38° to 40° (3.3° to 4.4° C.). A beautiful Sunday. Find very little oosuk-skin on hand. Henry, Bender, Dr. Pavy, and Schneider have been eating lashings, thongs, boot-soles, etc., which happened to be in their possession. Was out to-day on the rocks just in rear of the tent, and managed in five hours' time to pick about two quarts of tripe de Roche; Bierderbick got about the same, or perhaps a little more. Connell gathered about six pounds of dried saxifrage for fuel. Brainard brought in only two pounds of shrimps. Obliged to eat the last seal-skin thongs in stew this afternoon, with which we mixed the tripe de Roche and reindeer-moss. The day has been a very warm and pleasant one. I am treating myself. Bierderbick is sick and very weak this evening. Gardiner is very weak; and Schneider also, but better than yesterday. Connell is about the same. The others are quite worn out by their work; Long in hunting, Brainard shrimping, and Frederick cooking. Found a bunch of purple saxifrage in full bloom. Brainard found yesterday a few Eskimo relics. We told him it was a ruling passion strong in death, as he has always been gathering up articles of that kind."

"June 9th.—A calm, fair day; temperature ranging from 36° to 42° (2.2° to 5.6° C.). The party succeeded in getting Dr. Pavy and Bender into the ice-crack. All are very weak. Connell shows signs of scurvy in bleeding gums, and Schneider in his swollen, stiff knees, while Gardiner and Bierderbick are weaker. I was out on rocks fifty yards distant for six hours, and got a quart of tripe de Roche; and Bierderbick the same.

Connell gathered five pounds of saxifrage. Brainard got about two pounds of shrimps. Long very weak and sick, unable to hunt last night. It is his thirty-second birthday. Gave him a spoonful of the gill of brandy remaining. Schneider this evening appeared to wander a little. Had nothing but tripe de Roche, tea, and seal-skin gloves for dinner. Without fresh bait we can do little in shrimping, and so live on lichens and moss alone. Elison expressed a desire that his arms and legs should go to the Army Medical Museum in the interests of science. His case is most singular; he is in the best health of any of us. Schneider is doing no outside work, but wrote up yesterday an account of Elison's November trip at his dictation. Bierderbick is engaged in writing up the medical case; his term of service expires in five days, and he promises faithfully to complete it, but cannot believe that he will last much longer. His service has been faithful indeed."

"June 10th.—A calm, cloudy day, with temperature from 35° to 40° (1.7° to 4.4° C.). Gardiner is suffering very much. Long killed last night a Brent goose, which he lost, and a dovekie. The dovekie went to the hunters to-day, although there were some unpleasant remarks made about it. Very few shrimps were obtained. In the evening had only a stew of the tripe de Roche which was gathered by Bierderbick, Schneider, and myself. I was out nearly five hours, until driven from the rocks thoroughly chilled. The stewed tripe de Roche to-day was delicious, having boiled it for the first time. It leaves a sweetish taste in the mouth. Bierderbick told me this evening that inflammation of the bowels had set in in Gardiner's case, which must soon prove fatal."

"June 11th.—A clear, calm day, with temperature from 38° to 42° (3.3° to 5.6° C.), the warmest of the season. Thermometer exposed to the direct rays of the sun registered

63° (17.7° C.) this morning. Gardiner is in a very dangerous condition. Schneider is also very weak, and was unable to go out for lichens. Bierderbick weak, but went for lichens, as did Connell and I. Long this evening brought in two fine guillemots, one of which goes to the general mess and one to the hunters; our only chance is to keep strength in them and in the cooks, so I directed that they eat, while out, such extra tripe de Roche as they could pick."

"June 12th.—A clear, calm day, the temperature ranging from 34° to 38° (1° to 3° C.). Long came in with no game; and Brainard brought back the unfortunate news that the floes at his shrimping-grounds had broken up and been driven out by the late gale, so that he lost not only the shrimps, but the nets and rope. In consequence we have for breakfast only tea and such roasted seal-skin as each one has left from the part issued a few days since. The misfortunes of the day are very discouraging, and affected the spirits and temper of some of the party. Gardiner died to-day of inflammation of the bowels and starvation. He was apparently dead at 11 A.M., and was removed from the tent; but, showing signs of life, later was deposited on an old buffalo-robe, where he died about 5 P.M. It will be necessary to bury him in the ice-foot. His death touched us all very nearly. We have become hardened to death by his constant invasion of our party, but Gardiner's death seemed especially trying, as he has appeared to live mainly by will-power for the past two months. The doctor predicted in April that Gardiner would be the next one to go, but he has lived until this time, six days later than the doctor himself; and mainly, as I believe, from his intense desire to return home and see again his wife and mother. In the early morning he was partly out of his sleeping-bag, holding in his hands an ambrotype of his wife and mother, which he continu-

ally looked at and frequently spoke to. His last words were "Mother! Wife!" Bierderbick to-day reports that Elison has bed-sores, which is not to be wondered at, and that he is weaker. Schneider is weaker, and of course it is needless to say that the remainder of the party are also losing strength. I was out five hours, and succeeded in scraping off the rocks near the tent nearly a gallon of tripe de Roche. Bierderbick and Connell were also out collecting what they could. Brainard to-day erected a distress flag on the point of the rocks, as a signal for any rescuing party. To-day is the first day at which any one had looked for a vessel, it being, as my menory serves me, the average date of whalers reaching the north water. Brainard has found a new place for shrimping, and we hope for better results, but are not certain of any. It will be necessary to make new nets, and Schneider has been directed to do the work, as he is unable to do work outside. I decided to have for supper two-thirds of the lichens collected to-day, and to keep the balance for breakfast."

Sergeant Gardiner was a young man of excellent habits, fine mind, and amiable disposition, and had ambition and application. He was a valuable man to the expedition in many ways, and had endeared himself to his comrades. He was more religious than perhaps any other one in the party; although allowed only eight pounds of baggage on the retreat, he denied himself to bring with him his Bible, our only one, though I had a prayer book.

"June 13th.—Strong southerly gale, with the temperature at the freezing-point (0° C.) at 7 A. M., but with a clear sky. Formally discharged Bierderbick to-day, his term of service having expired. Having no regular blanks, I gave him a written certificate of discharge, to be replaced by a regular one. Was unable to give him 'final statements.' The cold gale which

sprang up early this morning rendered it impossible, owing to the low temperature, for us to collect lichens. It reduced us to extremities for dinner, as Brainard got but a few shrimps. Issued to the party my seal-skin jumper, which had been reserved for shrimp-bait. Connell, Bierderbick, and Schneider succeeded in eating all their allowance; I was able to eat but very little of mine, but ate instead about an ounce or two boiled lashings which I had saved; also cut off the dirty, oil-tanned covering of my sleeping-bag, and divided it between the party, so that each man could have his part as desired."

"June 14th.—Re-enlisted Bierderbick as a hospital steward of the first class, subject to approval. The day calm but cloudy, with temperature ranging from 37° to 42° (3° to 6° C.). The party suffered very much from the prevailing wind of yesterday, but Bierderbick, Connell, and I were able to pick lichens, of which we got probably a dozen quarts. Gardiner was buried in the ice-crack; the party not being strong enough to dig a grave or carry him to the ridge through the snow. Connell saw an oosuk seal on the moving ice some distance from the shore, and several small seals in pools near the shore. Long has hopes of striking one on the fast ice. Brainard found to-day an old eider-duck's nest, showing that they breed here, which gives us a certain amount of encouragement. Considerable conversation was had to-day over the fact that three years since the expeditionary force sailed from Baltimore."

"June 15th.—Light snow at 7 A.M., with temperature below the freezing-point, being at 30° (−1.1° C.). All weak this morning. Issued to most of the party their part of the oil-tanned skin from sleeping-bag. I cannot eat now, nor can the rest, so that we retained the covering of my old bag to be divided when we cannot do without it. Brainard and Long to-day, owing to some comments of Connell, decided to put all

lichens which they can collect when hunting and shrimping in the general mess, as Frederick, the cook, has lately done. These three are now very weak, but still able to help themselves and the rest. Schneider is quite helpless, more from his mental discouragement than from physical weakness. It is with great difficulty that we can get him to sit up in his bag, and he will only do so when food comes to him, or from great pressure on the part of the entire party. Bierderbick, Connell, and I can gather lichens near the tent, but can do nothing else; except Bierderbick, who regularly cares for Elison and dresses his wounds on alternate days. Brainard gets a few shrimps. Long hunts, but lately has been unfortunate; I tell him to eat if he gets game; he saw many walruses last night; also ducks, other birds and seals, but none in reach."

I quote from Schneider's diary again: "Two of us, Elison and myself, are unable to do anything. We are living on only a few lichens and shrimps now." On the 16th and 17th he says: "The sleeping-bag cover roasted and boiled to suit each one. I had my skin boiled. . . . I am only able to sew on boots and keep up the diary. The last of the skin divided to-day."

"June 16th.—A strong northwest gale commenced in the straits last night, but abated this morning. The temperature 37° (2.8° C.), at 7 A.M. It was too cold and cloudy in the forenoon to pick lichens. The party are now eating oil-tanned skin, which is very repugnant to us. All are weaker and much discouraged. I do not know how we live, except on our hopes and expectations of a ship. Schneider last evening begged for opium pills, with which he could end his life, but found no one to help him to them. He was in better spirits this morning, but had to be handled like a child this afternoon, being as helpless physically as Elison. Connell's mouth seems much worse. Whether his scurvy is increasing or not I cannot say,

but his gums are certainly in very bad condition, swollen and bleeding. Brainard found the minimum thermometer (No. 590) which was blown away by the gale of December last."

"June 17th.—Brainard brought in substantially no shrimps. It is quite evident that we can get none until we have perfectly fresh bait, as the seal-skin is of no use. Tried saxifrage tea to-day. There was a difference of opinion in the party regarding its quality. Brainard found a lemming-head last night, which was very old; in fact, the bones crumbled to pieces between his fingers. He also saw old tracks of hare, and some musk-ox hair. Bierderbick has also seen the latter, which confirms Nares' statement regarding the animal on this coast. Brainard also saw an old walrus-skull. Long saw quite a number of walrus last night. Expectation berg has left us, probably having been floated off by the spring tides. Connell not well to-day; in consequence we got fewer lichens. Frederick seems to be giving out; Brainard was obliged to get wood from the boat. The sun was exceedingly warm to-day, the thermometer in the sun showing a temperature of 63° (17.2° C.), and in the tent of 73.5° (23.1° C.). Issued the oil-tanned seal-skin to the party. Schneider was unable to cut his up, and so I did it for him."

"June 18th.—The temperature was down to 30 (−1.1 C.) last night, and but 30.5° (−0.8° C.), with a fresh wind and clouded sky, at 7 A.M. Schneider was very weak and out of his head in the morning, and later became unconscious. He wandered a great deal, but not unpleasantly, and died at 6 P.M. Brainard got no shrimps; I am afraid we will have to give it up until we get birds or other bait. He is now collecting tripe de Roche with all the rest of us. Long killed two birds, but was unable to get them. Bierderbick was troubled very much by rheumatism; but, despite his excruciating pain, showed his devotion by attending to Elison's wounds, and then went out to pick

lichens with Connell and myself. Bierderbick says he is much stronger to-night, but Connell complains of being worse, and Bierderbick gave him an opium pill. Brainard found to-day a small piece of drift-wood thirty feet above the tide-level."

Schneider had done good service as clerk, and more especially in raising and training the puppies born at Conger, which contributed materially to the success of our geographical work.

On June 20th I crawled out a few yards behind the tent to pick lichens, but Connell was unable to venture out. Bierderbick remained in the tent to dress Elison's wounds, and arranged on his stump a spoon, so that the poor cripple could eat his stewed seal-skin. Before Bierderbick could come out to assist me a storm came up, which drove me in.

My diary says: "20th, 7 A.M., clear, calm, 29°, minimum 26.8° (−1.7° and −2.9° C.). Six years ago to-day I was married and three years ago I left my wife for this Expedition, what contrast! When will this life in death end?"

The morning of the 21st broke with the gale still raging, and it was with the greatest difficulty that Frederick was able to cook our wretched stew of lichens and heat up some stewed seal-skin, the remnant of the oil-tanned and filthy covering of my sleeping-bag. During the day the gale continued with unabated violence, with a mean temperature of 31° (−0.6° C.), and a minimum of 28° (−2.2° C.), an unprecedented degree of cold for a midsummer day. Our tent gradually gave way inch by inch before the gale, and all efforts to straighten it or to improve our condition proved futile, owing to our enfeebled condition. By evening the front portion of the tent rested on the ground, pinning Brainard, Long, and myself in our sleeping-bags so we could hardly stir.

My diary says: "21st, 11 A.M., south gale, 34° (1.1° C.). At 8.30 A.M., it commenced snowing. Connell's legs paralyzed

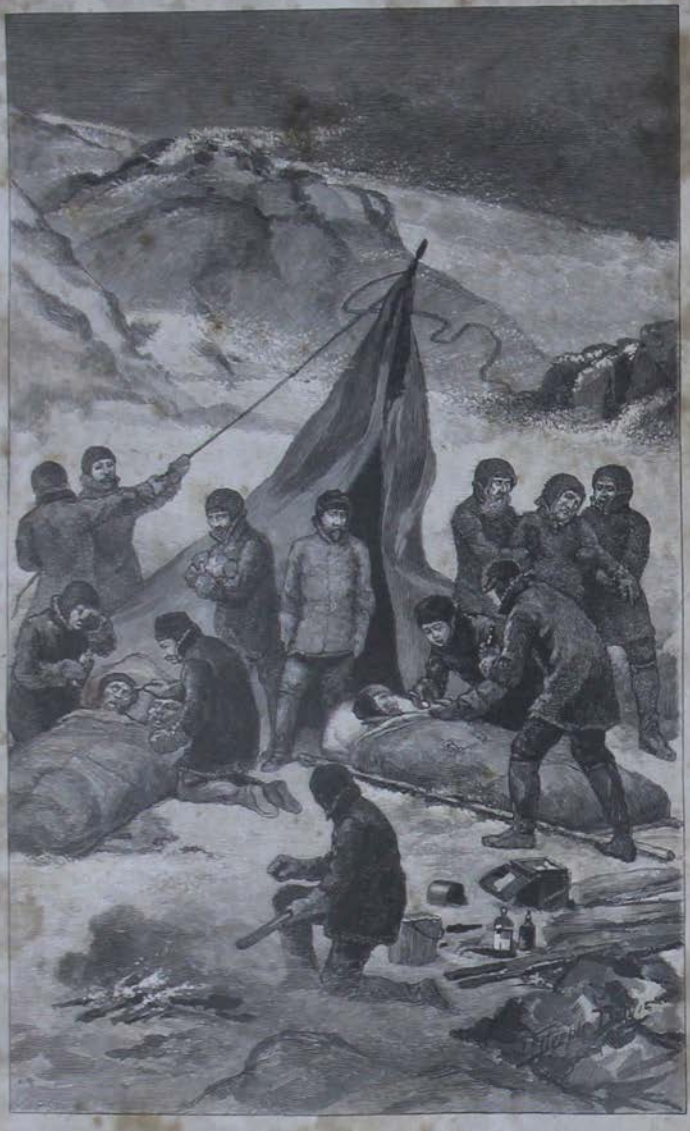
from knee down. Bierderbick suffering terribly from rheumatism. Buchanan Strait open this noon a long way up the coast."

With these words my journal ends. When I began this work I contemplated using my diary for notes, and writing from it, but as I advanced with the records of the last year

Private Maurice Connell.

this became more and more difficult. I am not yet far enough away from that time. Again, it may be quite as interesting to the reader to see what was written from day to day.

The only marked objection to this form is that it does not indicate sufficiently the kindly feeling and thought for others that was daily and hourly testified in that miserable life. This was the rule, and therefore was not dwelt upon. The reverse



THE RESCUE, JUNE 23, 1884.

was exceptional, and so noted; and, as I have before said, the rest must be read between the lines.

By the morning of the 22d we were all exhausted, and it was only through the energy and devotion of Frederick or Brainard, I do not remember which, that we obtained, about noon, some water. That and a few square inches of soaked seal-skin was all the nutriment which passed our lips for forty-two hours prior to our rescue. Connell was very feeble, and the end of all was approaching. I tried with indifferent success to read from my prayer-book and the few scraps we had, but the high wind and lack of food made it too exhausting.

Near midnight of the 22d I heard the sound of the whistle of the Thetis, blown by Captain Schley's orders to recall his parties. I could not distrust my ears, and yet I could hardly believe that ships would venture along that coast in such a gale.

I feebly asked Brainard and Long if they had strength to get out, to which they answered, as always, that they would do their best. I directed one to return with the news if any vessel could be seen. Brainard came back in about ten minutes from the brow of the hill, some fifty yards distant, reporting in a most discouraging tone that nothing was to be seen, and said that Long had gone over to set up the distress flag, a short distance away, which had blown down. Brainard returned to his bag, while a fruitless discussion sprang up as to the noise, wherein Bierderbick suggested that the vessel was in Payer Harbor, which I could not believe, as I thought the whistle must be from a ship running along the coast. We had resigned ourselves to despair, when suddenly strange voices were heard calling me; and, in a frenzy of feeling as vehement as our enfeebled condition would permit, we realized that our country had not failed us, that the long agony was over, and the remnant of the Lady Franklin Bay Expedition saved.

Connell, scarcely conscious, was on the verge of the grave, and others were in almost as critical a condition. Bierderbick, the moment he realized our relief, acted with the same unselfish and considerate spirit as had ever characterized him. The two spoonfuls of whiskey left were divided; one given instantly to Connell, and on my refusing the second it went with its fellow. As ever in our history, the weak and helpless had naught but kindness and consideration from the stronger.

RELIEF SQUADRON OF 1881 AT GODHAVN, GREENLAND.

(From a photograph.)

CHAPTER LI.

CONCLUSION.

IT had seemed impossible to us that ships should venture on that dangerous, rock-bound coast—with a heavy pack threatening—in a gale which was yet so violent that we were transported the few hundred yards to the ship with great peril. Such prompt action and the taking of such risks evidence most strongly Captain Schley's appreciation of the urgency of the situation and his ability to cope with it. More caution and less daring on his part would have proved fatal to us.

The officers of the squadron treated us all with the most careful and considerate kindness, not such as was dictated by a sense of official duty, but such as springs from brave men's hearts when stirred by great pity and compassion. In mentioning Captain Schley, Lieutenant Emory, and Chief Engineer Melville in this respect, I must add that none were second in good offices to those named.

The watchful skill and unwearying personal attentions of Surgeons Green and Ames insured the building up of the faint spark of vitality which remained in us. Less judicious supervision and firmness might easily have proved fatal. The generous, impulsive seamen gave indiscriminately; and Long, I am told, was found loaded down with concealed biscuit which he had begged. Lieutenant Colwell's wise discretion in feeding us at first should be particularly noticed. Deaf alike to my entreaties, orders, and abuse, he doled out slowly a few ounces of food while the surgeons were coming. The judg-

ment, coolness, and discretion shown by him in a subordinate capacity the year before in disaster remained with him now in this hour of success.

Sergeant Elison died at Godhavn, July 8th, consequent on secondary amputation, which was absolutely necessary and equally hopeless. Though both hands and both feet had been lost by natural amputation, his indomitable will-power and naturally fine physique kept him alive for seven and a half months. Utterly helpless, fed with double our ration, cared for and nursed by his starving comrades, no open word or secret insinuation ever came to me that this drain on our strength and supplies was useless—this man a burden. I hardly know now whether most to admire the courage and will which kept Elison alive, or the devotion and charity of his comrades who gave so freely of their strength, food, and tender offices, knowing all the while that their sacrifices were in vain, except as a concession to their spirit of humanity and Christian charity.

Sergeant Elison was an honest, faithful man, who never spared himself when the interests of his comrades or of the expedition could be advanced. He was equally valuable in the workshop or field, as botanist, carpenter, or sledgeman.

This narrative properly ends with the rescue from the brink of the grave of the seven survivors of the Lady Franklin Bay Expedition. The story of the rescue has been modestly told by the chief actor, who dilates but little on the remarkable energy and great daring displayed by Lieutenant Emory and himself. No relief or expeditionary vessels ever ventured at so early a date the dangers of Melville Bay, and the zealous ardor of their commander encompassed the relief ships with the hazards and perils of that ice which is never entered except by the hardiest and most fearless navigators of the present day—the Scotch whalers. I may be pardoned for differing from my friend and

rescuer, Captain Schley, in believing that the remnant of the expedition, saved from a horrible death through his zeal, energy, and daring, owes much to the indirect influence of these bold navigators. Not only did the Scotch whalers set forth on their voyage many days earlier than was customary, but with their usual skill and energy improved every opportunity, and by their numbers searched out the only available passages. Captain Schley, himself an apt pupil, profited by their experience and advice, and throughout the passage of Melville Bay there was a kindly feeling of generous rivalry in the search. Had the whalers delayed their voyage, or had they looked unkindly on the work, the relief squadron must have missed some of their opportunities; and, despite their great zeal and daring, reached Sabine days later, which meant the extermination of the party.

The wise act of Congress in offering a bounty to the whalers was the turning-point in our fortunes, and exemplifies the importance of utilizing all resources when the honor or credit of the nation is at stake. That the United States Navy won in the race for Sabine is an illustration of the wonderful adaptability and abundant resources of the representative American seaman, which so well fits him for coping successfully with new and untried dangers and makes him a worthy rival of "our kin across the sea."

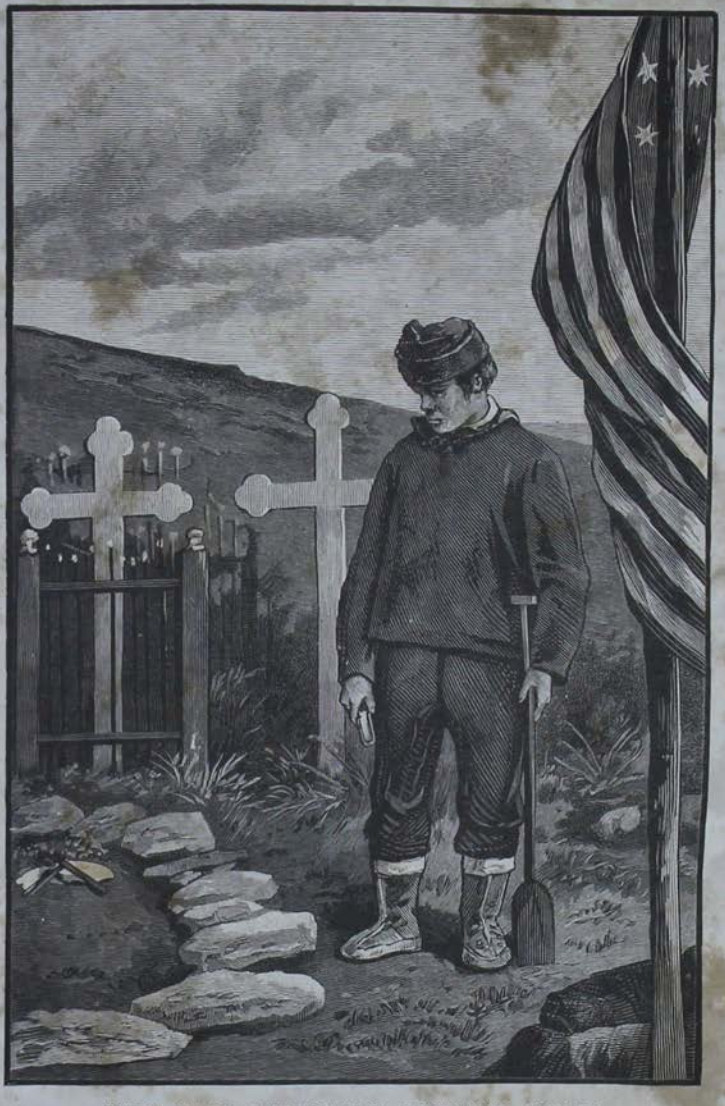
As to other matters which have engaged an undue share of public attention, while having no official knowledge of the facts in the case, yet the responsibility for all action in connection with such an expedition rightfully and properly rests on the commanding officer. In assuming that responsibility I know of no law, human or divine, which was broken at Sabine, and do not feel called on as an officer or as a man to dwell longer on such a painful topic.

I should be unjust to the dead (and equally so to the living)

if I did not call attention to their arduous labors, heroic endurance, and unflinching determination, which advanced the national ensign into an unparalleled latitude both on sea and land, carried out the programme of international scientific observations, increased, perhaps in an unequalled degree in this century, our knowledge of the physical characteristics and configurations of polar lands; and which, more than all, in one of the most remarkable and successful boat journeys of the age, brought safely their records, at the price of great bodily suffering and with diminished chances of life, through a dense polar pack to a point whence they would eventually reach the world. They died for that end, and should not be forgotten.

The history of our reception, participated in by eminent men of the nation, is also known. From the President came later grateful words of thanks in behalf of himself and the Nation; Her Majesty the Queen of Great Britain, with her woman's gracious heart, was not content with sending the staunch Alert to our relief, but sent, too, on our return, kindly words of inquiry and sympathy; the eloquent message of the Honorable the Secretary of the Navy, whose zeal and interest insured the prompt and thorough outfitting of the relief expedition, and kindly greetings of other prominent men, will ever be held in remembrance by the survivors. These and other recognitions which have come to me as the chief may be considered a sufficient recognition of my share in the extraordinary successes and sufferings of the expedition.

It is inevitable in most great undertakings that the subordinates should be relegated to secondary places, but I cannot believe that our great nation, which spent money so lavishly to save these men, will allow their heroic endurance and manly virtues to pass unrewarded. Lieutenant Lockwood and the Eskimo Christiansen have unhappily passed away, but Sergeant



ESKIMO PASTOR AT THE GRAVE OF CHRISTIANSEN, GODHAVN.

(From a Relief Squadron photograph.)

Brainard, who strove with them successfully to gain for the country the honors of the Farthest North, yet remains, after eight years of stainless and extraordinary service in the ranks, a sergeant. His manhood, courage, and self-sacrifice, displayed on the polar sea and at Sabine, would have gained him a commission at once in any other service of the world.

No man of the party has received promotion, except such temporary advancement as my personal urging could secure. Two men, with broken health, have adventured their private fortunes; and one, a most self-sacrificing, soldierly, temperate, and loyal man, lies, as these lines are penned, helpless in a city hospital, aided by private charity, his pension not even awarded.

Even the meagre allowances originally promised for Arctic service have not been fully paid, and the widows of the dead are generally as yet unrecognized.

Our great country in these days asks not in vain for its sons to venture their lives for any idea which may subserve its interests or enhance its greatness. I trust that posterity may never mourn the decadence of that indomitable American spirit which in this generation fought out to the bitter end its great civil war, and made it seem an easy thing in time of peace to penetrate the heart of Africa, to perish in the Lena Delta, to die at Sabine, or to attain the Farthest North.

APPENDICES.

I.—MEANS OF THE METEOROLOGICAL OBSERVATIONS MADE AT FORT CONGER, GRINNELL LAND, 81° 44′ N., 64° 45′ W., 1881–1883.

	Temperature.								Pressure.				
	Mean.	Max.	Date.	Min.	Date.	Hours below. 32° F.	Hours below. 0° F.	Hours below. Frozen mercury.	Mean.	Max.	Date.	Min.	Date.
1881.													
August....	*a* 33.3	*a* 45.9	12th	*a* 15.6	31st	*a* 289	*a* 0	*a* 0	*b* 29.841	*b* 30.118	24th	*b* 29.398	9th
September.	10.9	30.0	4th	-10.4	30th	720	141	0	*c* 29.802	*c* 30.248	4th	*c* 29.058	10th
October...	-9.2	9.0	3d	-31.1	18th	744	636	0	*c* 29.890	*c* 30.505	23d	*c* 29.364	4th
November.	-24.5	-3.0	2d	-43.0	30th	720	720	18	*c* 29.760	*c* 30.208	12th	*c* 29.236	22d
December.	-32.0	-10.0	2d	-52.2	20th	744	744	190	*d* 29.709	*d* 30.183	27th	*d* 29.157	1st
1882.													
January...	-38.3	-9.5	16th	-58.2	10th	744	744	397	29.717	30.229	3d	*c* 29.026	16th
February..	-46.5	-10.0	25th	-62.1	3d	672	672	567	29.754	30.613	6th	29.153	1st
March.....	-29.9	-7.0	21st	-46.8	25th	744	744	98	29.738	30.613	17th	28.993	2d, 29th
April	-8.6	13.9	15th, 16th	-42.1	3d	720	515	11	30.151	31.000	9th	29.632	16th
May	17.4	35.8	29th	1.1	11th	727	0	0	30,130	30.522	23d	29.640	15th
June	33.1	53.0	30th	12.7	3d	268	0	0	29.929	30.362	1st	29.416	16th
July	36.8	50.3	1st	30.0	12th	12	0	0	29.714	30.211	3d	29.178	28th
Year	-4.8	53.0	June 30th	-62.1	Feb. 3d	7,104	4,916	1,281	29.844	31.000	April 9th	28.993	Mar. 2d Mar. 29th

a 5th to 31st inclusive (hourly). *b* 8th to 31st inclusive (3, 7, 11, A.M. ; 3, 7, 11, P.M.). *c* 3, 7, 11, A.M. ; 3, 7, 11 P.M. (daily).
d 3, 7, 11, A.M. ; 3, 7, 11 P.M., 1st to 15th inclusive (daily); 16th to 31st inclusive (hourly). *e* 29.020 (5.45 P.M.).

	Wind.				Rainfall and Melted Snow.	Weather.
	Mean velocity in miles.	Resultant and miles.	Highest velocity in miles.	Date.	Per cent. of calms.	Inches.	Per cent. of cloudiness.
1881.							
August.....	2.85	S. 22.0° E. 308.4	16 S. 16 N.E.	27th 31st	18.3	0.15	49.2
September....	3.80	N. 44.9° E. 1,143.7	30 N.	10th	25.1	0.23	31.8
October.....	2.01	N. 79.1° E. 749.8	17 N.E.	8th	49.9	0.23	24.5
November	1.42	N. 64.9° E. 536.3	11 N. 11 N.E.	6th 7th	66.0	0.29	15.9
December	0.80	N. 77.8° E. 390.0	19 E.	24th	83.9	0.39	25.7
1882.							
January.....	1.50	N. 65.4° E. 667.6	60 N.E.	16th	78.4	0.57	18.0
February.....	0.60	N. 79.3° E. 166.0	8 S.W.	17th	76.6	0.11	14.7
March.....	1.13	S. 79.9° E. 386.5	20 S.E.	30th	63.7	0.28	22.6
April.....	3.16	S. 64.0° E. 1,033.5	26 E.	25th	9.0	0.20	17.1
May.....	3.51	S. 72.4° E. 875.5	21 E.	8th	4.8	0.23	34.1
June.....	5.44	S. 21.9° E. 2,218.6	28 S.E.	28th	0.8	0.26	33.5
July	5.02	S. 13.2° E. 2,058.0	33 S.E.	28th	0.4	1.01	62.5
Year	2.60	S. 61.42° E. 7,593.6	60 N.E.	January 16th	39.7	3.95	29.13

MEANS OF THE METEOROLOGICAL OBSERVATIONS MADE AT FORT CONGER, GRINNELL LAND, 81° 44′ N., 64° 45′ W., 1881–1883 (*Continued*).

	Temperature.								Pressure.				
	Mean.	Max.	Date.	Min.	Date.	Hours below.			Mean.	Max.	Date.	Min.	Date.
						32° F.	0° F.	Frozen mercury.					
1882.													
August....	35.3	47.8	21st	22.8	31st	142	0	0	29.810	30.107	7th	29.459	9th
September.	18.1	27.4	5th	0.7	21st	720	0	0	29.741	30.179	18th	29.273	21st
October ...	-7.7	14.0	1st	-23.5	19th	744	597	0	29.904	30.340	27th	29.361	10th
November.	-28.0	-1.1	15th	-46.0	29th	720	720	35	29.958	30.506	26th	29.163	15th
December.	-27.8	5.5	26th	-43.9	31st	744	737	45	30.134	30.588	12th	29.590	18th
1883.													
January...	-35.8	-18.0	5th	-50.6	16th	744	744	297	29.875	30.417	1st	29.122	25th
February..	-38.9	-5.0	21st	-56.5	27th	672	672	434	29.590	30.217	1st	ƒ28.968	19th
March	-17.9	20.0	14th	-49.1	1st	744	720	57	30.049	30.779	5th	29.385	22d
April.....	-14.8	6.6	29th	-37.3	3d	720	686	0	30.047	30.686	23d	29.312	4th
May	14.8	32.3	22d	-13.0	1st	743	103	0	30.002	30.687	8th	29.474	30th
June	32.4	39.6	11th	22.7	2d	301	0	0	29.827	30.218	13th	29.448	9th
July	37.2	52.4	12th	28.8	6th	69	0	0	29.865	30.147	10th	29.514	20th
Year.....	-2.8	52.4	July 12th	-56.5	Feb. 27th	7,063	4,979	868	29.900	30.779	Mar. 5th	28.968	Apr. 19th
Two years.	-3.8	53.0	July, 1881	-62.1	Feb., 1881.	14,167	9,895	2,149	29.872	31.000	Apr., 1881	28.968	Apr., 1882

ƒ Below 29.000 (10 A.M., 19th, to 1 A.M., 20th, inclusive).

	Wind.					Rainfall and Melted Snow.	Weather.
	Mean velocity in miles.	Resultant and miles.	Highest velocity in miles.	Date.	Per cent. of calms.	Inches.	Per cent. of cloudiness.
1882.							
August.....	5.07	S. 29.8° E. 2,320.2	28 S.	19th	1.6	0.61	60.0
September....	4.66	N. 42.8° E. 934.2	31 N.	6th	6.6	0.47	34.1
October	2.93	N. 37.8° E. 1,443.3	33 N.E.	3d	38.4	0.24	30.5
November	1.03	N. 81.4° E. 453.2	22 S.E.	15th	58.0	0.11	13.7
December	0.90	N. 76.1° E. 312.6	20 N.E.	30th	61.4	0.21	15.2
1883.							
January.....	0.43	N. 84.6° E. 233.4	8 E. and N.E.	27th	75.2	0.27	12.6
February.....	0.42	N. 78.3° E. 175.3	Various.	Various.	68.5	0.15	9.5
March.....	2.40	S. 45.3° E. 794.2	52 S.W.	8th	25.3	0.61	23.8
April.....	1.62	N. 83.2° E. 716.1	15 S.W.	20th	18.6	0.14	15.4
May	3.90	S. 81.7° E. 928.0	40 N.E.	14th	10.3	0.58	20.8
June.....	5.76	S. 9.9° E. 507.9	37 N.E.	24th	3.5	0.11	52.2
July	3.80	S. 37.5° W. 6,565.4	34 N.E.	20th	2.4	0.32	36.7
Year.....	2.74	S. 67.3° E. 6,436.9	52 S.W.	March 8th	30.8	3.82	27.04
Two Years .	2.67	....	60 N.E.	January, 1881	35.25	7.77	28.08

II.—MEAN PRESSURES AND TEMPERATURES AT INTERNATIONAL POLAR STATIONS, 1882-1883.

(Barometer in English inches, and temperatures and degrees Fahr.)

	Jan Mayen.		South Georgia.		Kingawa.		Spitzbergen.		Godthaab.	
	Pressure.	Temp.	Pressure.	Temp.	Pressure.	Temp.	Pressure.	Temp.	Pressure.	Temp.
1882.										
July	29.686	38.1°	.....	....	.....	....	.....	....	.....	....
August.....	29.686	37.6°	.....	....	.....	....	*e* 29.534	*e* 36.3°	29.760	40.3°
September.....	29.640	35.4°	29.552	30.7°	*c* 29.713	*c* 32.5°	29.427	29.4°	29.556	37.2°
October	29.779	35.8°	29.386	34.3°	29.741	12.0°	29.624	25.7°	29.434	26.4°
November	29.611	28.5°	29.331	37.4°	29.796	-0.8°	29.580	16.6°	29.619	22.1°
December	29.892	14.7°	29.221	38.8°	.961	-7.1°	29.703	-1.4°	29.701	18.5°
1883.										
January	29.409	18.9°	29.154	40.1°	29.560	-23.1°	29.287	3.3°	29.111	14.5°
February	29.290	24.0°	29.315	41.7°	29.445	-32.3°	29.208	16.7°	29.095	4.1°
March	29.976	13.4°	29.264	38.1°	29.776	-6.2°	29.567	2.0°	29.745	21.2°
April	29.758	27.1°	29.245	32.7°	29.863	4.5°	29.653	19.5°	29.646	21.9°
May	29.784	24.9°	29.595	31.6°	29.875	30.4°	29.731	22.9°	29.800	32.2°
June	29.938	35.3°	29.473	27.0°	29.654	36.5°	29.627	35.2°	29.737	36.9°
July	29.954	38.3°	29.504	27.9°	29.701	42.4°	29.640	40.0°	29.753	43.3°
Year	*a* 29.704	*a* 27.8°	*b* 29.368	*b* 34.5°	*b* 29.734	*b* 11.2	*f* 29.548	*f* 20.5°	*f* 29.580	*f* 26.5
August.....	.....	....	29.382	34.0°	29.727	45.3°	*g* 29.699	*g* 42.2°	29.697	41.2°
September.....	.....	....	.....	....	*d* 29.441	*d* 37.0°	.....	....	.....	....

a To July 1, 1883. *b* Including August of 1883. *c* 16th to 30th inclusive. *d* 1st to 9th inclusive. *e* August 15th to 31st.
f Excluding August of 1883. *g* August 1st to 23d.

	Dijmphna (Sea of Kara).			Point Barrow.		Lady Franklin Bay.		Orange Bay.		Fort Rae.[l]	
	Position 1st of each month.	Pressure.	Temp.	Pressure.	Temp.	Pressure.	Temp.	Pressure.	Temp.	Pressure.	Temp.
1882.											
July	.....	.....	....	29.804	43.2°	29.714	36.8°	.....	....	.....	....
August	S. side Nova Zembla.	29.851	38.3°	29.811	37.9°	29.810	35.3°	.....	....	.....	....
September	Near Waigat I.	29.922	28.9°	29.812	31.5°	29.741	18.1°	29.452	[k]42.0°	29.286	41.5°
October	70° 10′ N. 64° E.	30.004	12.0°	29.898	8.8°	29.904	-7.7°	29.288	42.4°	29.176	31.5°
November	70° 15′ N. 64° E.	29.965	-1.8°	29.828	-7.1°	29.958	-28.0°	29.209	44.2°	29.267	-8.4°
December	70° 14′ N. 64° E.	30.044	-1.5°	30.118	-17.1°	30.134	-27.8°	29.392	46.2°	29.415	-17.5°
1883.											
January	70° 53′ N. 65° E.	29.721	-19.1°	29.965	-16.9°	29.875	-35.8°	29.370	46.0°	29.582	-22.5°
February	70° 01′ N. 64° E.	29.815	-1.8°	30.218	-6.3°	29.590	-38.9°	29.491	48.1°	29.520	-12.9°
March	71° 20′ N. 65° E.	29.650	-2.7°	30.028	-13.3°	30.049	-17.9°	29.160	42.6°	29.588	-16.4°
April	71° 30′ N. 64.5° E.	30.229	9.7°	30.027	-2.8°	30.047	-14.8°	29.378	40.9°	29.331	-11.4°
May	71° 33′ N. 64.5° E.	29.973	14.9°	29.881	23.2°	30.002	14.8°	29.510	39.9°	29.408	28.7°
June	71° 20′ N. 64° E.	29.835	31.1°	29.941	32.3°	29.827	32.4°	29.453	36.1°	29.213	45.8°
July	71° 11′ N. 64° E.	29.729	35.1°	29.883	36.2°	29.865	-37.2°	29.484	37.7°	29.248	55.5°
Year	.....	[g]29.895	[g]11.9°	[h]29.951	[h]8.9°	[h]29.900	[h]-2.8°	[j]29.378	[j]41.9°	[j]29.357	13.8°
August	71° 11′ N. 63° E.	29.875	31.6°	[i]29.770	[i]37.0°	.....	....	29.352	37.5°	29.251	51.8°
September	71° 00′ N. 60° E.	29.756	30.6°	.....	....	.....	....	.....	....	.....	....

[g] Excluding August of 1883. [h] August 1, 1882, to July 31, 1883. [i] August 1st to 27th inclusive. [j] September, 1882, to August, 1883, inclusive. [k] 26th to 30th (inclusive). [l] Pressure not reduced to the sea. Fort Rae hourly observations not received at O. C. S. O. These are the means of the Fort Rae 7 A.M. (Washington time) observations.

Remarks.—Spirit thermometer has a correction at 32° F. of −0.3°, and at −38.0° of −3.9°. The mercury thermometer at 52° F. has a correction of −0.9°. These corrections have not been applied, as it is not stated whether they apply to dry- or wet- bulb thermometer at Fort Rae.

III.—MEAN AND MINIMUM TEMPERATURES AT VARIOUS POLAR STATIONS.

NOTE.—The following data have been drawn from "British Contributions to Arctic Meteorology," Schott's "Discussions," Nordenskjold's, Payer's, Lefroy's, and Bessel's works, and the "Arctic Manual," the later publication being used only where originals were inaccessible.

	Melville Island. 74° 47′ N. 111° W.		Winter Island. 66° 11′ N. 83° W.		Igloolik. 69° 21′ N. 82° W.		Port Bowen. 73° 13′ N. 89° W.		Boothia Felix. 69° 59′ N. 92° W.						Repulse Bay (Fort Hope). 66° 32′ N. 87° W.			
	1819-1820.		1821-1822.		1822-1823.		1824-1825.		1829-1830.		1830-1831.		1831-1832.		1846-1847.		1853-1854.	
	Mean.	Min.	Mean.	Min.	Mean.	Min.	Mean.	Min.	Mean.	Min.	Mean.	Min.	Mean.	Min.	Mean.	Min.	Mean.	Min.
August.....	*a*	*a*	36.9	28	33.9	27	35.8	*c* 25	....	....	40.6	33.0	36.5	24.0	....	....	....	....
September..	22.5	-1	31.6	20	25.1	11	25.9	16	29.8	17.0	27.3	5.0	23.5	6.0	*d* 28.5	*d* 16.4	24.1	-2.0
October	-3.5	-28	13.2	-13	13.7	-9	10.8	-12	8.4	-16.7	10.9	-11.0	8.9	-23.0	13.0	-13.4	10.5	-16.9
November ..	-20.6	-47	7.9	-20	-18.6	-32	-5.0	-26	-6.1	-37.0	-10.8	-39.0	-1.2	-42.0	2.2	-23.2	-18.3	-40.2
December .	-21.8	-43	-14.2	-29	-28.2	-43	-19.0	-35	-23.4	-37.0	-19.1	-45.0	-24.0	-42.5	-17.4	-35.5	-24.9	-44.2
January....	-30.1	-47	-23.2	-38	-16.1	-45	-28.9	-42.5	-25.6	-43.0	-24.0	-56.5	-27.6	-47.0	-27.6	-44.1	-30.8	-48.2
February...	-32.2	-50	-24.0	-37	-19.6	-43	-27.3	-45	-28.6	-47.0	-31.2	-47.0	-33.7	-44.5	-25.1	-39.4	-34.4	-50.0
March.....	-18.1	-40	-10.7	-35	-19.0	-41	-28.4	-47.5	-20.2	-40.0	-33.2	-49.0	-31.4	-48.5	-24 2	-42.2	-16.2	-37.7
April	-8.4	-32	6.5	-13	-0.8	-25	-6.5	-37	0.8	-20.0	-4.6	-24.0	....	....	-0.1	-23.0	3.9	-31.8
May	16.7	-4	23.3	-5	25.1	-8	17.6	-7.5	15.3	-1.0	16.2	-15.0	....	....	18.6	-2.8	23.7	2.2
June.....	36.2	28	32.2	20	32.2	8	36.1	23	37.0	26.0	31.7	14.0	....	....	31.1	12.5	37.7	29.0
July	42.4	32	36.0	30	*b* 39.1	30	38.9	30	44.7	32.0	37.9	31.0	....	....	40.7	29.0	43.3	33.8

a August, 1820, 32.7° and 22°. *b* Mean, August, 1823, 5.7°. *c* For August, 1825. *d* 16 days.

	Port Leopold. 73° 50′ N. 90° W.		Point Providence. 64° 14′ N. 165° W.		Chloris Peninsula. 66° 58′ N. 173° W.		North Star Bay. 76° 34′ N. 69° W.		Fort Simpson. 62° 7′ N. 122° W.				Fort Confidence. 66° 40′ N. 119° W.					
	1848-1849.		1848-1849.		1849-1850.		1849-1850.		1849-1850.		1850-1851.		1848-1849.		1850-1851.			
	Mean.	Min.	Mean.	Min.	Mean.	Min.	Mean.	Min.	Mean.	Min.	Mean.	Min.	Mean.	Min.	Mean.	Min.		
August.....	e 33.4	e 27	....	....	45.0	....	33.8	22	....	....	....	....	....	....	....	....	....	....
September..	24.0	9	....	....	42.8	....	27.0	6	....	....	....	....	....	....		....	....	....
October	12.0	-8	25.5	....	25.0	....	12.6	-24	f 25.7	....	h 26.4	....	20.0	-6.5	16.1	-11.8	....	....
November ..	-11.1	-33	17.5	....	1.2	....	-16.3	-41	7.7	....	13.1	....	-2.4	-31.2	6.5	-31.3	....	....
December ..	-32.4	-50	3.8	....	5.2	....	-24.1	-49	-14.3	....	-7.6	....	-34.8	-59.4	-20.9	-49.8	....	....
January	-31.7	-44	-20.5	....	-12.0	....	-22.3	-41	-28.0	....	-20.6	....	-18.8	-51.0	-31.6	-72.0	....	....
February ...	-31.0	-52	-16.0	....	-15.5	....	-30.6	-54	-1.7	....	-8.5	....	-20.1	-56.0	-34.5	-58.0	....	....
March.....	-19.9	-42	-6.2	....	-6.0	....	-15.2	-51	-1.0	....	10.6	....	-14.4	-42.5	-14.2	-49.3	....	....
April.....	-5.3	-22	21.5	....	14.5	....	-3.0	-27	28.9	....	31.5	....	0.9	-34.0	10.9	-28.7	....	....
May.....	18.1	-1.6	29.5	....	30.0	....	25.6	2	50.8	....	47.3	....	....	....	28.4	5.2	....	....
June	32.3	14	38.0	....	....	....	39.4	24	g 62.9	....	....	....	....	....	j 43.7	....	....	....
July	36.2	32	44.4	....	....	....	39.8	28	....	....	....	....	....	....	....	....	....	....

e August, 1849. f 19 days. g 18 days. h 17 days. j 6 days.

MEAN AND MINIMUM TEMPERATURES AT VARIOUS POLAR STATIONS.

	Point Clarence. 69° 45′ N. 165° W.				Griffith Island. 74° 34′ N. 95° W.		Prince of Wales Strait, 72° 47′ N. 118° W. Mercy Bay, *n* 74° 6′ N. 118° W.						Walker Bay. 71° 35′ N. 118° W.		Cambridge Bay. 69° 3′ N. 105° W.		Camden Bay. 70° 8′ N. 145° W.	
	1850-1851.		1851-1852.		1850-1851.		1850-1851.		1851-1852.		1852-1853.		1851-1852.		1852-1853.		1853-54.	
	Mean.	Min.	Mean.	Min.	Mean.	Min.	Mean.	Min.	Mean.	Min.	Mean.	Min.	Mean.	Min.	Mean.	Min.	Mean.	Min.
August.....	44.9	....	46.5	....	*l* 35.0	*l* 30.0	36.5	27.1	37.6	21.0	33.2	19.0	*o* 37.1	*o* 25.0	*q* 38.5	*q* 33.0	*s* 20.4	*s* −4
September..	38.3	....	43.0	....	*m* 15.7	*m* 3.0	20.2	−1.1	24.6	1.0	20.1	−4.0	*p* 30.2	12	*r* 20.1	16.5	−0.8	−20
October	22.1	....	23.2	....	−0.6	−19.0	0.2	−22.9	3.3	−22.0	−5.6	−33.0	14.1	−11	4.4	−12.7	−9.5	−32
November ..	−3.2	....	4.6	....	−7.5	−31.0	−10.2	−31.9	−15.2	−40.0	−16.5	−42.9	−5.0	−31	7.2	−23.3	−24.9	−51
December ..	3.4	....	−2.8	....	−23.0	−39.5	−23.4	−40.0	−20.0	−44.0	−26.1	−47.9	−16.6	−45	−29.9	−46.5	−15.2	−49
January	−10.3	....	−12.0	....	−31.0	−45.0	−32.5	−51.0	−27.3	−51.0	−43.9	−64.9	−18.1	−41	−36.2	−52.5	−30.6	−51
February...	9.4	....	−7.9	....	−32.5	−46.0	−37.7	−51.0	−25.8	−47.0	−38.5	−57.0	−16.3	−39	−29.3	−48.0	−18.8	−47
March.....	2.6	....	6.6	....	−25.6	−43.0	−28.8	−51.0	−28.4	−51.9	−25.1	−58.0	−22.6	−43	−17.0	−50.2	−1.2	−26
April	17.7	....	5.3	....	−7.0	−29.0	−4.8	−31.9	−1.4	−38.0	....	....	9.9	−20	−2.9	−22.5	22.4	0
May.....	33.7	....	32.0	....	9.3	−20.0	18.9	−4.9	10.2	−26.9	....	....	16.0	−3	17.1	−12.0	32.4	23
June.....	40.1	....	40.8	....	32.2	10.0	36.1	27.1	31.5	11.1	....	....	32.5	19	32.5	−16.5	37.7	27
July	51.9	....	*k* 47.7	....	36.5	27.5	37.5	32.0	36.7	30.0	....	....	41.3	32	39.8	32.0	....	....

k Mean of July, 1850. *l* August 1 to 10, 1851. *m* 19 days. *n* Mercy Bay from October, 1851. *o* August, 1852. *p* 18 days.
q August, 1853, 14 days. *r* 8 days. *s* 16 days.

	Batty Bay. 73° 12′ N. 91° W.		Beechy Island. 74° 5′ N. 92° W.				Northumberland Sound. 74° 31′ N. 97° W.		Wellington Channel. 75° 31′ N. 92° W.		Van Rensselaer Harbor. 78° 37′ N. 70° 53′ W.				Port Kennedy. 79° 01′ N. 94° W.		Port Foulke. 78° 18′ N. 73° W.	
	1851-1852.		1852-1853.		1853-1854.		1852-1853.		1853-1854.		1853-1854.		1854-1855.		1858-1859.		1860-1861.	
	Mean.	Min	Mean.	Min.	Mean.	Min.	Mean.	Min.	Mean.	Min.	Mean.	Min.	Mean.	Min.	Mean.	Min.	Mean.	Min.
August	....	....	....	....	34.5	....	*t* 34.2	*t* 22.5	*u* 36.0	*u* 29.5	....	....	31.8	20.2	....	....	(36.1)	....
September..	24.1	5.0	18.5	....	18.5	....	18.5	−1.0	17.2	2.0	17.2	−0.7	9.7	−8.8	*v* 25.7	....	22.6	7.3
October	9.5	−10.0	−1.4	....	7.4	....	−1.3	−21.0	....	−9.0	1.6	−22.4	−8.8	−37.8	6.6	−21.5	7.6	−13.0
November..	−6.3	−38.0	−6.6	....	−15.6	....	−4.6	−27.0	−5.5	−22.0	−22.4	−41.8	−21.5	−47.9	−11.9	−36.1	2.8	−17.0
December ..	−16.3	−34.0	−35.5	....	−24.1	....	−30.1	−41.0	−10.2	−27.0	−25.5	−44.0	−36.8	−59.9	−34.1	−49.0	−12.8	−27.0
January	−20.7	−44.0	−31.6	....	−31.4	....	−38.6	−57.0	−14.1	−38.0	−29.2	−58.3	−27.2	−65.5	−34.7	−49.8	−26.0	−43.0
February ...	−18.6	−39.0	−18.0	....	−33.0	....	−28.2	−44.0	−18.4	−38.0	−32.6	−66.4	−20.2	....	−37.3	−48.8	−24.9	−38.0
March	−13.8	−46.0	−13.0	....	....	....	−17.5	−51.0	−15.9	−34.0	−36.8	−54.2	−33.0	....	−18.3	−33.9	−22.3	−38.0
April	7.1	−18.0	1.8	....	....	....	−9.2	−25.0	5.2	−25.0	−7.7	−41.7	−13.0	....	−3.5	−27.5	−11.0	−27.5
May	....	....	19.0	....	....	....	15.0	−7.5	13.4	−9.5	13.4	−7.5	....	....	14.7	−2.0	23.8	−1.0
June.....	....	....	36.8	....	....	....	31.9	22.5	31.0	18.0	30.1	18.4	....	....	35.3	18.5	33.8	16.0
July	....	....	39.4	....	...	....	36.7	26.5	38.3	32.0	38.2	28.0	....	....	40.1	30.0	40.5	31.0

t August, 1853. *u* August 1 to 23, 1854. *v* 16 days.

MEAN AND MINIMUM TEMPERATURES AT VARIOUS POLAR STATIONS.

	Sabine Island. 74° 32′ N. 19° W.		Thank God Harbor. 81° 35′ N. 61° 44′ W.		Polaris House. 78° 19′ N. 72° 51′ W.		Discovery Harbor. 81° 44′ N. 65° W.		Floeberg Beach. 82° 27′ N. 61° 29′ W.		Franz Josef Land. x 79° 51′ N. 59° E.				Pitlekaj. 67° 05′ N. 187° E.			
	1869-1870.		1871-1872.		1872-1873.		1875-1876.		1875-1876.		1872-1873.		1873-1874.		1878-1879.			
	Mean.	Min.	Mean.	Min.	Mean.	Min.	Mean.	Min.	Mean.	Min.	Mean.	Min.	Mean.	Min.	Mean.	Min.		
August.....	33.2	21.0	w 36.1	w 25.8	....	....	32.7	26.0	31.9	24.5	32.9	19.4	32.7	21.6	....	....	....	....
September..	24.2	10.9	23.3	13.9	....	....	18.5	2.4	15.6	0.2	16.5	-9.8	25.5	4.1	....	....	....	....
October	7.1	-8.9	-1.4	-19.0	....	....	-9.8	-39.0	-5.0	-32.2	1.6	-27.6	0.7	-20.0	22.6	-5.4	....	....
November ..	-1.0	-13.7	-8.6	-25.9	-1.8	-17.4	-18.4	-46.0	-16.8	-45.7	-11.9	-32.6	-15.7	-39.6	2.1	-17.0	....	....
December ..	1.2	-17.9	-15.7	-30.3	-8.8	-29.7	-24.5	-54.0	-22.1	-46.5	-21.9	-32.6	-19.9	-44.5	-9.0	-34.8	....	....
January	-11.5	-28.5	-22.1	-45.5	-29.3	-41.8	-40.6	-63.0	-32.9	-59.2	-8.7	-47.0	-12.1	-50.6	-13.1	-51.0	....	....
February...	-10.9	-40.4	-23.2	-46.5	-25.5	-42.5	-35.0	-62.0	-38.0	-66.5	-30.9	-51.0	-19.4	-47.9	-13.2	-47.6	....	....
March.....	-10.0	-29.2	-23.5	-45.1	-25.1	-40.8	-37.0	-70.8	-39.8	-73.8	-25.4	-44.2	-9.5	-51.0	-7.0	-39.6	....	....
April.....	2.3	-24.7	-7.7	-33.2	-4.7	-31.5	-17.3	-42.5	-18.0	-46.5	-5.4	-37.5	4.3	-19.3	-2.1	-36.4	....	....
May	22.2	-1.3	16.8	-9.7	13.2	1.1	10.0	-20.5	11.2	-14.9	16.0	-9.4	....	....	19.8	-16.2	....	....
June	....	....	36.4	25.8	....	....	32.5	16.5	32.5	18.2	31.1	12.6	....	....	31.0	6.3	....	....
July	....	....	40.6	32.4	....	....	37.2	29.6	38.4	29.0	34.8	28.0	....	....	y 36.8	y 30.2	....	....

w August, 1872.

x Ship beset in 76° 22′ N., 63° E., August 20, 1872, and drifted to above position by October 1, 1873.

y 17 days.

IV.—MAXIMUM THICKNESS OF SALT-WATER ICE OBSERVED AT VARIOUS POLAR STATIONS.

Station.	Latitude. north.	Date.	Thickness in inches.	Station.	Latitude. north.	Date.	Thickness in inches.
Melville Island.....	74° 47′	May 17, 1820.	90	Wellington Channel	75° 37′	March 24, 1854.	68
Winter Island	66° 11′	March 7, 1822.	55	Port Kennedy	72° 01′	April 11, 1859.	74
Port Bowen	78° 13′	May 4, 1825.	86.5	Sabine Island.....	74° 32′	May 21, 1870.	79
Gulf of Boothia....	69° 59′	April 30, 1830.	90	Floeberg Beach	82° 27′	May 4, 1876.	79.2
Gulf of Boothia....	69° 59′	April 30, 1831.	72	Discovery Harbor..	81° 44′	April 30, 1876.	39.2
Gulf of Boothia....	69° 59′	March 31, 1832.	84	Discovery Harbor..	81° 44′	May 21, 1882.	59.8
Assistance Bay	74° 40′	May 10, 1851.	91	Discovery Harbor..	81° 44′	May 1, 1883.	57.8
Walker Bay	71° 35′	April 1, 1852.	67.5	FRESH-WATER ICE.			
Dealy Island.....	74° 56′	March 15, 1853.	84	Lake Alexandra....	81° 40′	March 9, 1882.	80
Cambridge Bay	69° 03′	May 1, 1853.	98	Lake Alexandra....	81° 40′	May 21, 1883.	67
Camden Bay.....	70° 08′	June 1, 1854.	86	Igloolik	69° 21′	June, 1823.	60–84

V.—RESULTS OF SOUND EXPERIMENT AT FORT CONGER, GRINNELL LAND.

Date.	Number of shots.	Mean velocity per second.	Distance in feet.	Temperature.		Remarks.
				Fahrenheit.	Centigrade.	
1882.						
October 10th....	7	1,070.7	4,197.0	1.5°	-16.9°	Snow and light wind.
" 12th ...	10	1,068.6	4,197.0	-7.6°	-22.0°	Calm and clear.
" 17th ...	9	1,041.6	4,197.0	-14.9°	-26.1°	Clear, light wind.
" 26th ...	9	1,032.3	4,197.0	-13.6°	-25.3°	Calm, detached clouds.
November 2d ...	5	1,015.0	4,197.0	-18.0°	-27.8°	Snow interfered with action of chronograph key by which five records were imperfect. The entire record not satisfactory owing to key.
" 3d ...	7	1,018.02	4,197.0	-13.2°	-25.1°	Sound fairly sharp. The record, however, as a whole is poor, and this is retained only for use in case no shots are fired at this temperature.
" 11th .	9	1,018.02	4,197.0	-34.1°	-36.7°	Calm and clear.
" 12th .	9	1,010.71	4,197.0	-31.8°	-35.4°	Clear, very light wind, northerly.
" 18th .	10	1,018.91	4,197.0	-32.6°	-35.9°	Clear and calm.
" 20th .	8	1,008.89	4,197.0	-25.6°	-32.0°	Clear, very light N.E. wind.
" 21st..	10	1,014.87	4,197.0	-30.4°	-34.7°	Clear and calm.
" 22d ..	9	1,011.59	4,197.0	-32.6°	-35.9°	Clear and calm A.M.
" 22d ..	*a* 17	1,022.09	4,197.0	-32.6°	-35.9°	Clear and calm A.M.

a Colt's army revolver.

Date.	Number of shots.	Mean velocity per second.	Distance in feet.	Temperature.		Remarks.
				Fahrenheit.	Centigrade.	
November 22d ..	10	1,025.86	4,197.0	-32.6°	-35.9°	Clear, very light N.E. wind, P.M.
" 22d ..	*a* 22	1,016.94	4,197.0	-32.6°	-35.9°	Clear, very light N.E. wind, P.M.
" 29th .	*a* 18	1,008.80	4,197.0	-44.3°	-42.4°	Clear and calm.
December 2d....	*b* 14	1,009.89	4,197.0	-40.1°	-40.1°	Clear and calm.
" 20th..	*a* 37	1,035.55	4,197.0	-19.5°	-28.6°	Calm, light snow.
" 26th..	34	1,033.59	4,197.0	-19.9°	-28.8°	Clear, very light wind.
1883.						
January 4th	20	1,003.39	4,197.0	-39.2°	-39.6°	Clear and calm.
" 14th ...	34	1,024.4	4,197.0	-40.0°	-40.0°	Clear, very light E. wind.
" 16th ...	38	994.24	4,197.0	-46.1°	-43.4°	Cloudy, light S. wind, barely perceptible.
" 19th ...	18	976.75	4,197.0	-43.1°	-41.7°	Clear and calm.
	18	977.87	8,394.0	-43.1°	-41.7°	
February 3d	14	991.50	4,197.0	-51.6°	-46.4°	Clear and calm.
	29	1,002.72	4,197.0	-51.6°	-46.4°	
	43	999.00	4,197.0	-51.6°	-46.4°	
" 27th ..	3	1,029.5	4,197.0	-51.9°	-46.6°	Clear and calm.
	42	1,017.68	4,197.0	-52.1°	-46.7°	
" 28th ..	46	1,004.98	4,197.0	-54.1°	-47.8°	Calm.

a Colt's army revolver. *b* 10 rifle; 4 revolver.

APPENDIX VI.

ETHNOLOGY.

By Lieutenant A. W. Greely.

A renewed interest has sprung up in late years as to the extent to which the Arctic regions have ever been populated. While the Lady Franklin Bay Expedition made no astonishing ethnological discoveries, yet its observations have resulted in no inconsiderable addition to our knowledge of the former inhabitants of Grinnell Land and Northern Greenland.

Concerning the most northern inhabitants of the globe, the Cape York Eskimo,* I have to speak only incidentally. Discovered by Sir John Ross, in 1818, our subsequent and more complete knowledge of them has been obtained from Kane, Hayes, and Bessels. They range in Greenland between the seventy-sixth and seventy-ninth parallels, from the borders of the inland ice of Baffin Bay to the southern edge of Humboldt glacier. Their favorite hunting-fields are Whale and Wostenholme Sounds, and winter-quarters to the westward of the former are occupied by but few of the natives. The most northerly village is Etah, in 78° 18′ N., on the shores of Foulke Fiord, with which the narratives of Kane and Hayes have made all familiar. This village was temporarily deserted in the summers of 1875 and 1881, but natives were seen there in 1882, and the relief expedition of 1884 communicated with natives who had passed the previous winter at Etah. These Eskimo are not entirely cut off from the rest of the world, but occasionally communicate with their brethren of the west side of Davis Strait.

*Photographs of several of these natives were taken by Ensign Harlowe, U.S.N., of the relief squadron of 1884, three of which are faithfully reproduced in these volumes under the titles of An Etah Native, vol. ii., p. 233, and Arctic Highlanders, herewith.

ARCTIC HIGHLANDERS—SAUNDERS ISLAND NATIVES.

(*From a photograph of the Relief Squadron*, 1884.)

Such was believed to be the fact by nearly all cognizant of the habitat of this people. During the return voyage after my rescue, the Bear was visited by an *oomiak* and *kayak* filled with Eskimo, one of whom was tattooed. Whether, as surmised by Captain Schley, these boats and natives came from Pond Inlet, it is certain that they came from the west side of Davis Strait, and this single fact outweighs and disposes of the theory advanced that the Arctic Highlanders, as the Cape York Eskimo are called, are the remnant of a lost people and reached Prudhoe Land from the north. Inglefield saw a party of the Pond Inlet Eskimo on North Devon Land, in a harbor nearly half way from their usual habitat to Cape Faraday, whence they could cross to Cape Alexander or Whale Sound.

For my own part the Etah Eskimo are but scattered bands of the great Eskimo nation, which I regard as indigenous to such outlying lands of the Arctic Circle as are free from an ice-cap. Subsisting principally on the seal and other large sea-game, and occasionally on the reindeer and musk-ox, they have necessarily been a wandering and migratory nation whose summer and winter habitations have rarely been identical.

The Parry Archipelago, from Banks Land and Melville Island eastward to Pond Inlet and Ellesmere Land, is covered with the remains of Eskimo huts and other traces of their permanent or temporary habitation. To the northward of the seventy-ninth parallel traces of Eskimo wanderings are scarcely less numerous. In 1872 Mr. Bryan found the ruins of several stone huts, the site of an old Eskimo settlement on Offley Island at the mouth of Petermann Fiord. The character of the remains indicated permanent habitation. The British Expedition of 1875–76 discovered traces of summer encampments or winter-quarters in Franklin Pierce, Dobbin, Rawlings, and Discovery Bays. At Radmore Harbor, 80° 25′ N., such ruins of long-deserted *igloos* were found as indicated a large settlement. Of the most northerly remains Feilden says: "Close to Cape Beechy we came across the most northern traces of man that have yet been found; these consisted of the framework of a large wooden sledge, a stone lamp in good preservation, and a very perfect snow-scraper made out of a walrus tusk." I concur with him in the belief that the wandering Eskimo here crossed Robeson Channel to Hall Land.

Our own discoveries of Eskimo remains to the northward of the

eighty-first parallel were numerous and interesting. Evidences of temporary or permanent occupation we noted at Cape Baird, at the head of Ella Bay, at numerous points in the vicinity of Fort Conger, in Black Rock Vale, on the shores of Sun Bay, on both sides of Chandler Fiord, and in the valleys on the south side of Lake Hazen. Many of these remains were in the interior of Grinnell Land at distances from the sea varying from fifty to one hundred miles by the route necessarily followed.

The remains indicate that these natives possessed dogs, sledges, coniferous wood in considerable quantities, stone lamps, iron in small quantities, the bone of the narwhal and walrus. The presence of combs proves that they were accompanied by women. The ornamentation of the combs, and an elaborately worked ivory cap for the top of an upstander, show that these people were above the lowest levels of savage life.

It is to be remarked that, with one exception, these habitations were contiguous to arms of the sea or water-courses which afforded a practicable roadway during the greater portion of the year. The exception referred to was a peculiar, and possibly only an apparent, one. At the very head of Black Rock Vale, within a few miles of the eighty-second parallel, and probably in the same latitude as the remains considered by Feilden the most northern in the world, I noted the site of several Eskimo summer encampments. The fact of their past occupancy was apparent at a glance, but my exhausted condition at that time did not permit of careful examination. Subsequent reflection caused me to believe that these sites were occupied at the time when Black Rock Vale formed an arm of the sea, a period not so far distant, as indicated by the coniferous trees found embedded, in the face of a steep bank, a few feet above the present level of Lake Heintzelman.

An especial interest attaches to the scattered relics and the ruined houses found by me at the junction of Ruggles River and Lake Hazen, which have been described in the narrative.

The ground plan of one of these houses, given in vol. i. p. 38, is of the most northern *permanent* habitation ever known to civilized man, built and occupied by the Eskimo, of Grinnell Land.

Facing page 406, vol i., is an accurate reproduction of the most interesting articles found in and near the houses referred to. Almost without exception, they are of bone. The use to which a

number of these article were put is problematical, while others conform closely in shape and material to sledging and hunting gear now in use, not only in Danish Greenland, but among the natives of the Parry Islands.

The climatic conditions of Grinnell Land are undoubtedly such at the present day as to preclude permanent occupancy by any class of men, much less the improvident Eskimo. It is true that the adjacent inlets moderately abound in seal, and the fertile belt of Grinnell Land affords abundant pasturage for several hundred musk-oxen. The seal, however, can be secured only three months in the year, while musk-oxen, falling an easy prey to the hunter, would be speedily exterminated.

Much as I could have wished to find evidences of long-continued occupancy of these lands by the Eskimo, yet I was forced to a contrary conclusion. The lack of graves alone is quite conclusive on this point. I opine that favorable years and the migration of the reindeer and musk-oxen gradually led these natives northward along the coast of Grinnell Land, and later into its interior. Of the many abandoned encampments in Grinnell Land only two evidenced other than temporary occupancy, and these, judging from the surroundings, of but few years.

Misfortune and disaster doubtless overtook many. The sledge, with its dogs, is the strongest evidence of prosperity among the Eskimo, and it is abandoned only under stress of dire necessity. Yet no less than six sledges, and the shoes of several others, have been found in the West Greenland channel to the northward of the eighty-first parallel. This fact proves the loss of a corresponding number of dog-teams, which entailed great suffering and probably loss of life. While a portion crossed Robeson Channel to Greenland, others probably retreated to the southward part of Kennedy Channel (perhaps to Radmore Harbor), where open water, an abundance of seal, and some reindeer rendered life possible. It is interesting in this connection to note that the most northerly points where marked evidences of numerous and permanent encampments have been found (Radmore Harbor and Norman Lockyer Island) are coincident with the probable northern limit to-day of the reindeer and the walrus.

As to the subsequent movements of those who crossed to Greenland, I differ with Feilden, and incline in certain respects to the

opinion advanced by Markham. As I have before stated I do not believe that the Arctic Highlanders reached their present habitat from the northward, as has been advocated by both these authorities. I deem it possible and probable that a portion of the Eskimo in the vicinity of Sabine Island, crossing Greenland near the eighty-second parallel, reached the east coast by the same route as the musk-ox. This hypothesis depends on a very slight point, as must all such. In Koldewey's "German Expedition," on page 516, Figure 13, is represented a wooden stick, which in shape is identical with a bone implement found by me in the interior of Grinnell Land. Its use is unknown, but I do not think it to be a bat. Figure 17, page 577, is a bone cap made to fit the top of an upstander, the use of which was unknown to the Germans. One almost identical in shape was found by me on the wooden upstander itself. Several worked pieces of wood not unlike No. 3, page 515, were found by me, and were supposed to be part of wooden snow-knives, though the German surmise may be correct that they were for toys. The woman's skinning-knife which I discovered resembled in shape Figure 5, page 515, although the blade was of iron in Grinnell Land, and of slate on the East Greenland coast. *One* of the systems of fastening the bone shoe to the runner in Grinnell Land was identical with that shown by Figure 4, page 515. Be this as it may, the advent and passing of these children of the ice is not only of interest in itself, but has an important bearing on the change of surface elevation, the advance or retrogression of the glacier system, and other similar physical phenomena, which in turn have an important bearing not only on the climatic conditions of the Arctic regions, but of the world in general.

APPENDIX VII.

NATURAL HISTORY NOTES.*

By Lieutenant A. W. Greely.

CETACEA.

No. 1. *Balæna mysticetus* (Linn.).—Lieutenant Egerton found a part of the rib of a Greenland whale near Floeberg Beach, in 82° 33′ N. Feilden was unwilling to give an opinion which would account for its presence, but is satisfied that no whale at the present day could inhabit Lincoln Sea. No Greenland whales were seen by us north of Cape York. A rib, presumably of a Greenland whale, was, however, found by Lieutenant Lockwood near the head of Archer Fiord, in August, 1882; and Sergeant Brainard saw what he thought to be the rib of a whale to the northeast of Cape Sabine, in front of the glacier where shrimping was done in the winter of 1883–84. Probably, when the land north of Sabine was of a thousand feet lower elevation, and these inland seas correspondingly larger, the Greenland whale frequented these northern waters.

No. 2. *Orca gladiator* (Bonn.).—This grampus, or sword-fish, was observed just north of Cape Lieber, 81° 35′ N., August 5, 1881, by the mate of the Proteus, who claimed familiarity with the species. It was apparently in pursuit of a school of white whales.

No. 3. *Beluga catodon* (Linn.).—The white whale had not been seen in Smith Sound prior to the one observed by us on Au-

* These notes are simply such as might be expected from the observations and considerations of natural history matters by an observer untrained in such matters. It is to be regretted that there was no trained naturalist with the expedition, to collect and prepare satisfactory data as to the habits and peculiarities of Arctic animals, but it is hoped that these notes may not be entirely devoid of interest to either laymen or scientists.

gust 5, 1881, north of Cape Lieber, about 81° 35′ N. There was some question as to the fact, but I saw no reason to doubt the accuracy of the statements of several of the crew of the Proteus, who knew the animal, the more particularly as a school of narwhals was seen at the time, and it has been generally accepted that the range of the narwhal and the white whale are the same. My own observations agreed with those of the party generally, that both narwhals and white whales were seen. Parry, in 1827, saw white whales still farther north, near the edge of the pack, in 81° 40′ N., on the Spitzbergen meridian. A white whale was seen several miles north of Cape Sabine, April 13th, by Eskimo Jens, and a school of them May 9 and 10, 1884, by Sergeant Frederick.

No. 4. *Monodon monoceros* (Linn.).—The narwhal, or unicorn, was seen near Cape Sabine in August, 1875. The range of the narwhal to the northward of Smith Sound undoubtedly depends upon the freedom from ice of Kane Sea and Kennedy Channel. There seems no doubt that at times this animal reaches even the polar sea to the northward of Grinnell Land, as a horn was picked up near Floeberg Beach, in 82° 27′ N., by Lieutenant Parr. On August 5, 1881, a school of narwhals was seen by us in Hall Basin to the northward of Cape Lieber, and one of them was struck with a lance by one of the Eskimo, but escaped. A considerable number were observed on two occasions later in the same place. They were seen again during our retreat in August, near Cape Cracroft, about 81° 20′ N., and in September, 1883, off Bache Island.

UNGULATA.

No. 5. *Ovibos moschatus* (Zimm.).—A portion of the Barren Lands of British America, the Parry Archipelago, and other lands to the northward of the continent are the only regions now occupied by this interesting species. No trace of the animal has been found in Southern Greenland, though it abounds on the eastern and northern coasts. The existence of the musk-ox in Greenland and Grinnell Land with but little doubt resulted by migration from the American continent northward over the adjacent islands and their intervening frozen straits. Scarcely one of these islands has been visited where remains of the musk-ox have not been found. At one time Smith Sound must have been crossed by these animals,

as some skulls have been found in Inglefield Land north of the seventy-eighth parallel. That the species never reached Danish Greenland is confirmatory evidence that the inland ice which flows into Kane Sea, as the Humboldt glacier, likewise debouches by discharging glaciers into Melville Bay. To this extent I differ from Feilden, who inclines to the opinion that the musk-ox reached Inglefield Land southward from Washington Land. Not only the opinion that there is little more difficulty in crossing Smith Sound in a favorable spring than Robeson Channel causes this belief, but my experience regarding the remains in Grinnell Land. Very few skulls were found by me in the interior; and, with one exception, they failed to show great age, thus indicating a comparatively modern migration. On the other hand, the remains near Humboldt glacier and Foulke Fiord show signs of great age.

Although I found recent traces of musk-oxen within less than thirty miles of the head of Greely Fiord, yet I agree with Feilden that they followed the east shore of Grinnell Land in their journey northward. Feilden reports abundant and recent traces of the animal in Alexandra Harbor, Buchanan Strait. The dung of the musk-ox was discovered by us at Cape Hawks, Rawlings, and Carl Ritter Bays, and an animal was killed by Sergeant Brainard, November, 1882, not far above the latter bay. Sergeant Brainard discovered fresh traces at Thank God Harbor in March, and Lieutenant Lockwood at Cape Britannia, 82° 44′ N., and at Cape Benet, 83° 03′ N., in May, 1882. This not only proves that the species was not exterminated by the Polaris party in Northern Greenland, but renders it very probable that the musk-oxen of Koldewey originally reached the east coast through Nordenskiold, Victoria, Nares, or possibly Sherard Osborn Fiord and the connecting valleys. I have elsewhere referred to my belief that the northern limit of the inland ice of Greenland is to the south of those fiords, and that the character of the country is like the interior of Grinnell Land. To the northward repeated inlets exist, increasing greatly the difficulty of the animals passing around the extreme north of Greenland. I am thoroughly satisfied of the natural disinclination of the musk-ox to cross ice, both from observation of our musk-calves, who could not be driven on it, and from the tracks of adults, which followed carefully in places the longer, rough, rugged shore of Ruggles River rather than cross snow-covered ice by a

shorter route. This migration to the east coast must have been a modern one, certainly within the present century. This opinion obviates the necessity of further advancing on this ground the idea that "Greenland must end not far north of latitude 82° or 83°."

As to Grinnell Land, observation shows that instead of the range of the musk-ox being confined to the coast-line and debouching valleys, as has been advanced, he is found feeding and wandering in the whole fertile belt between Archer and Greely Fiords, and from Chandler Fiord to the head of Very Valley.

Feilden has described the ovine character of this species. In addition I might say that when in numbers they generally form a circle, with young cows and calves in the centre, and that much bellowing and threatening attitudes followed, but they were never found dangerous. My own discoveries settle a number of questions which puzzled Feilden, and we know that not far from two hundred musk-oxen are now habitants of Grinnell Land, fed by abundant vegetation. Willow, saxifrage, dryas, and grasses form winter as well as summer food. I found large beds of willows that had been fed on during April, the musk-oxen having broken the crust and scraped off snow to reach them. This was doubtless a favorite pasture-ground, as plenty of saxifrage and scanty grass was in the same section. I observed musk-oxen scraping the snow from grass, saxifrage, and dryas in early autumn, using their hoofs for the purpose. The animal, as all Arctic mammals must, quenches its thirst with snow. It was surprising that the open river discovered by me in April, 1882, showed no track of visiting cattle, although we saw many within a few miles of it. I suppose not less than fifty herds or solitary animals were observed feeding, and none were ever seen eating lichens. The most fertile lichen grounds showed no signs of the animal. Feilden found only willows and grasses in the stomachs examined by him.

It appears possible that the animal ekes out its winter food, which in darkness must be gathered under extraordinary disadvantages, by its fat, as Nordenskiold has indicated is the case with the reindeer in Spitzbergen.

Ten musk-oxen killed in the autumn of 1882 averaged three hundred and sixty pounds of dressed meat, while two killed the following spring weighed two hundred and sixty pounds each; less by far than any of the ten. The largest, which weighed about twelve hundred gross, dressed four hundred and thirty-two pounds.

The musky odor, I believe, will not be communicated to the meat if the animal is entirely dressed as soon as killed. A bull emitting a very marked odor when killed was dressed immediately, and showed no taint when eaten months afterward.

No. 6. *Rangifer tarandus* (Linn.).—The reindeer, formerly a habitant of Northern Grinnell Land, has evidently retreated southward many years since.

Lieutenant Gifford, May 19, 1876, picked up an antler in 82° 45′ N., and horns were found at Thank God Harbor in June, 1872. Probably a dozen antlers were gathered in the vicinity of Fort Conger, and as many more in the interior of Grinnell Land in the valleys near Lake Hazen; but no traces of a living animal could be found. Much to my surprise, I picked up a scrap of reindeer-skin about an inch square in a valley to the westward of Lake Hazen.

It is more than probable that a herd may yet exist in the vicinity of Rawlings Bay. The vegetation of the country adjacent to that point resembles in a marked degree that around Discovery Harbor, and was the most luxuriant observed by me north of Upernivik. Feilden found a reindeer-skeleton, recently picked by wolves, on the shores of Rawlings Bay in the neighborhood of Radmore Harbor, 80° 27′ N. Sergeant Brainard, August, 1883, found, five miles or more north of Cape Lawrence, about 80° 28′ N., a freshly picked skeleton of a young fawn, which Eskimo Christiansen said could not have been dead more than two years. In Twin Glacier Valley, Buchanan Strait, newly shed horns were found by Nares; but the animal is not a regular habitant of that valley.

RODENTIA.

No. 7. *Cuniculus* (*myodes*) *torquatus* (Pall.).—Major Feilden has pointed out that the ringed lemming was found in great numbers in Grinnell Land to its extreme northern point, in latitude 83° N., and to the extreme western point reached by Aldrich.

This lemming was first noted in Smith Sound by Dr. Bessels, in 1871. It had previously been found by Captain Scoresby, in 1822, on the eastern coast of Greenland.

The opinion put forward by Feilden, that the migration to the east coast was around the northern shores of Greenland, is further confirmed by the observations of Lieutenant Lockwood, who found

traces of this little animal on the north coast of Greenland as far as he went, to 83° 24′ N., and a specimen was obtained at Mary Murray Island, 83° 19′ N.

Sir John Ross found a skeleton of this species on a floe sixty miles north of Spitzbergen during Parry's remarkable boat journey of 1827. It evidently had strayed from Greenland.

The marked tendency of the lemming to wander in all directions, coupled with its known aversion to crossing large bodies of ice, is incidently the strongest proof that the inland ice, of which the great Humboldt glacier is an off-shoot, extends nearly across Greenland in that latitude, as Nordenskiold found it to do five hundred miles farther to the south. This is evidenced by the fact that, although known for over sixty years as a habitant of North Greenland, the lemming was not found by Kane, Hayes, or Bessels, in their successive explorations of the Greenland coast from Cape York to Humboldt glacier, and it is unknown to the Arctic Highlanders.

The certainty of its being a regular habitant, and not migratory, is beyond doubt. Tracks were seen at Floeberg Beach as early as February 11, 1876, and fourteen days later one was caught in its winter coat. Frequent tracks of the lemming were seen at intervals by us at Discovery Harbor during the *entire* winter.

The animal was first caught by us March 23, 1882. Its fur was then tipped with white, which gave it a peculiar pepper-and-salt appearance. One caught at Floeberg Beach, May 22, 1876, was, however, in its summer clothing of dark fur.

For some unknown cause comparatively few lemmings were seen in the vicinity of Discovery Harbor from 1881 to 1883.

Feilden has shown that the extraordinary development of the claws of the forefeet is seasonal, and that in late summer the claws are pointed and worn down to ordinary size.

Our observations confirm his statement that the animal does not hibernate, and that it principally feeds on the buds of the *Saxifraga oppositifolia*.

Many comfortable nests made by the lemming were found by me, being invariably of grass. Such of their holes as I examined had two entrances to their nests, the openings being at a distance apart so that the animal could use either in case of danger.

No. 8. *Lepus arcticus* (*glacialis*) (Leach).—The English Expedition of 1875 found the polar hare at the northern extremity of

Grinnell Land, and on May 17, 1876, its footprints were seen by Markham on the frozen polar sea, in 83° 10′ N., fully ten miles from land. Lieutenant Lockwood killed a hare on the North Greenland coast at Cape Benet, about 83° 03′ N., the most northerly example ever obtained. Tracks of the hare were seen at Mary Murray Island, 83° 19′ N., and at Lockwood Island, 83° 24′ N.

At Floeberg Beach hare-tracks were seen February 11, 1876, and a specimen shot eight days later. Tracks were seen by us as early as February 6th, and as late as December 22, 1882; strong, if not convincing, proof that the animal does not hibernate. We saw several burrows in the snow, which had been temporarily occupied by hares, resembling that found by Feilden in February, 1876. The earliest hare killed in the year by us was on February 15, 1882. It weighed eleven pounds, and its fur was pure white except a few perfectly black hairs at the tip of the ears. The specimen was in exceedingly good condition, showing that it had experienced no difficulty in obtaining proper food during a winter of unprecedented severity. It had been feeding on willow and saxifrage buds, similarly to the one killed by Dr. Moss, February 19, 1876, at Floeberg Beach.

I observed carefully the fur of quite a number of examples, both summer and winter, not only along the coast, but also in the interior of Grinnell Land. I thought it possible that the summer coating of the inland hare might resemble the grayish-brown color found in midsummer by Captain Sabine in the specimens killed on Melville Island. The only difference between the winter and summer furs of adults, as far as I could see, was a loss in summer of a considerable portion of the fine swan-down fur which underlies the longer, coarser hair. A young hare about two months old, caught in a valley near Lake Hazen, June, 1882, had mouse-colored spots on flanks and breast, and its ears were tipped with the same color.

The difficulty mentioned by Dr. Richardson, of skinning the hare in winter fur without tearing it, was not experienced by us. The skin pulled off, without particular care, whole and unbroken.

CARNIVORA.

No. 9. *Thalassarctos* (*ursus*) *maritimus* (Linn.).—The polar bear is rare in Smith Sound north of Cape Sabine. Feilden, however,

is probably mistaken in his opinion that the white bear at the present day never enters the polar basin through Robeson Channel. Hayes saw tracks near Cape Fraser May 12, 1861. One was killed April 3, 1872, near Bessels Bay, and an old cranium was found by Markham near Floeberg Beach. In 1876 Archer saw tracks near Cape Lupton March 29th; and Coppinger May 12th in Newman Bay, and May 28th in Petermann Fiord. Tracks were also seen May 23d, near Cape Beechy. In the spring of 1882, a bear travelling *southward* along the Grinnell Land coast disturbed our cache in Wrangel Bay, and in the following May two of them visited our party at Boat Camp in Newman Bay. On October 2, 1882, a bear visited our station several times, but was not secured, although he was seen and pursued until he took to open water toward Lady Franklin Bay. Lieutenant Lockwood, in May, 1882, noticed bear-tracks (going *northeast*) on the north coast of Greenland, near Cape Benet, in 83° 03′ N., the highest latitude in which the animal has ever been known. Previously, the most northern specimen was obtained by Parry north of Spitzbergen, in 82° 24′ N., July 14, 1827. Fresh bear-tracks were seen in September and October, 1883, near Cape Sabine, coming from and returning in the direction of Bache Island, and again in March and April, 1884. One weighing about four hundred and fifty pounds was secured April 12th, and a second one chased by us May 19, 1884.

With Feilden, I cannot understand why the bear ever leaves the rich hunting-fields of the "North Water" for the desolate shores to the northward. Nordenskiold has pointed out that the bear is sometimes a herbivorous animal, but vegetation and animal life are equally scanty to the northward from Cape Sabine.

No. 10. *Vulpes lagopus* (Linn.).—The Arctic fox is to be found in considerable numbers in the northern part of Grinnell Land, though only eight were obtained by us. He is much more wary and cunning than his brethren of the same species a few degrees of latitude to the south. It was very rare that a hunter could get within gunshot, and poisoned meat was so carefully rejected that, despite frequent baits, only one was obtained in that manner.

The activity of the fox in winter in that region can hardly be questioned, as the animal or his fresh tracks have been recorded every month except February. He frequents the northernmost parts of Greenland and Grinnell Land. Lieutenant Aldrich saw

fox-tracks near Ward Hunt Island, 83° 03′ N., and Lieutentant Lockwood observed numerous tracks at 83° 24′ N.

No summer specimen with even a bluish tinge was seen. August 9, 1882, a specimen was observed at Cape Baird; the color was a dirty white, with streaks of yellowish brown. October 31, 1882, a fox was seen on Bellot Island, with dirty yellowish-white fur. Jens trapped a fox November 19, 1882, which was pure white, except a few hairs in the very end of the tail. A specimen caught a couple of weeks earlier had a faint yellowish tinge to his coat. Their fur had a down-like appearance next the skin. The odor was very faint, and not especially disagreeable. One of the foxes was killed after a couple of months, as he was intractable, flew into a rage when approached, and could not be handled without biting seriously. I judged him to be an old animal. The younger was easily tamed, but whenever taken up would try his teeth very gently until assured of kind treatment. When caressed he gave out a purring sound, which we thought to be a sign of pleasure.

Both animals were very cleanly, and never were caught asleep, though for months an observer passed twice each hour through the place where they were confined. Whenever they received food they endeavored to conceal it, never eating it at once.

The young fox was made a pet, and was fed great quantities of food. He broke his chain, and digging into the snow-wall cached his extra food there, and then declined further communication. He finally escaped in April, selecting a time doubtless when the dogs were asleep.

Feilden proved conclusively that this fox caches supplies for winter food. He says of a fox-lair: "To our surprise we discovered numerous deposits of dead lemmings; in one hidden nook, under a rock, we pulled out a heap of over fifty. We disturbed numerous caches of twenty and thirty, . . . a small quantity of earth being placed over them. In one hollow we found the greater part of a hare hidden away. The wings of young brent geese were also lying about; . . . they must have been the results of successful frays of prior seasons, and . . . consequently the foxes occupy the same abodes from year to year. . . . Professor Newton had already suggested . . . that it laid up a store of provisions, and I was much pleased by thus being able to prove his theory correct."

Near Cape Sabine, in 1883-84, we killed twenty-five foxes, of which twenty were the blue fox. They were killed every month from October to February inclusive.

There has been much dispute as to the specific distinctness of the blue fox. I am able to confirm Dr. R. Brown's statement, that the color is not dependent on season. We could tell a blue fox from a white one in the dark by its weight, the blue being invariably smaller than the white fox. Of the twenty blue foxes two were slightly marked with white, indicating a mixed breed, but the eighteen were free from any sign or mark of white, yellow, or reddish. The color was hardly blue, but resembled very nearly the color of a pure Maltese cat, being perhaps a couple of shades deeper—toward a black. The specimens at Sabine averaged three and a half pounds for the blue, and a pound more for the white variety.

No. 11. *Canis lupus* (Linn.).—The wolf or his fresh tracks have been seen, or his howling heard, in Grinnell Land every winter month except November. One was seen October 30, 1882, and another February 10, 1882. They were heard howling near Dutch Island in December, and tracks were observed January 29, 1882.

The wolf has never been known in Greenland, except in two cases. A wolf was observed at Thank God Harbor April 1, 1872. Tracks a few days old had been previously seen in that locality February 4, 1872. The most northerly specimen is undoubtedly the animal whose tracks were observed, April 15, 1876, by Markham, near Cape Joseph Henry, 82° 50′ N. A band of eighteen crossed the harbor-floe within several hundred yards of Fort Conger September 15, 1881. In 1882 a band of a dozen was seen passing near the station. They stopped for a while and howled dismally and in concert, but discreetly remained out of gunshot.

No. 12. *Putorius* (*mustela*) *erminea* (Linn.).—The ermine was obtained by Feilden as far north as 82° 30′. Its activity throughout the winter is undoubted, as tracks were seen as early as February 19, 1876, at Floeberg Beach, and at Fort Conger as late as December 22, 1882. One wintered in our pile of commissary stores, and its tracks were seen occasionally until March 3, 1883, when it was shot. Its coat at that time was in winter fur, as was a specimen shot on September 29, 1882. It was entirely white except the end of the tail and a few of the anterior whiskers, which were black. One

would infer from this that the animal does not assume a summer coat in Grinnell Land, but a beautiful specimen in summer costume was seen by me near Distant Cape June 25, 1883. The greater part of the tail was then brownish black, the upper portion of the body chocolate or dark brown, with occasional black hairs, the whole giving an impression of chestnut. A portion of the animal, particularly the belly and the posterior part of the tail, was of a bright primrose-yellow tinge. The animal was on a ledge of rocks not more than ten or twelve feet distant. It showed no signs of fear, and while I was observing him closely watched me and gave utterance to shrill, chattering cries, which seemed to indicate curiosity rather than fear. Unfortunately I was without a gun, and could not obtain him.

Feilden has pointed out that the limits of the ermine, in Greenland and Grinnell Land, correspond with those of the lemming on which it feeds.

No. 13. *Phoca fœtida* (*or hispida*) (Fab.).—This seal is known as the fiord seal, or by the English whalers as the "floe-rat." Our own experiences bear out Feilden's, who says: "It was the only species seen north of Cape Union, and which penetrates into the polar sea." There is no doubt of the seal wintering in Robeson Channel. This variety was seen in the "Fire-hole" by Stephenson, at Discovery Harbor, several times in January and February, 1876. A small specimen, weighing fifty pounds, was killed by us in the water-hole, December, 1882. The seal had evidently visited the tide-hole quite regularly. In April, 1883, I found near the tide-crack at Fort Conger a cylindrical hole about a foot in diameter, which the Eskimo declared to be the breathing-hole of one of this species. The ice at that point was nearly seven feet thick at the end of the winter. This seal was also killed at an early date near the head of Archer Fiord, and was seen by Lieutenant Lockwood in Greely Fiord. It was also seen in the polar ocean by Lieutenant Lockwood near Cape Stanton, April, 1883, and by Dr. Pavy north of Cape Joseph Henry, April, 1882. This species was seen by Parry, in 1827, to the north of Spitzbergen as far as 82° 45′ N.

No. 14. *Phoca grœnlandica* (Müll.).—This seal has not been noted before in Smith Sound, except by Bessels, though there is no apparent reason why its range should not extend in this direction, as it

is found in the Greenland sea, and was occasionally seen north of Spitzbergen by Parry in 1827.

The most northern specimen seen was shot at, but not secured, six miles north of Hans Island, about 81° 30′ N., August 10, 1881. The entire crew of the Proteus were thoroughly familiar with this variety, and there was no possible chance of mistake in its identity, as the seal was near by and some time in sight.

It is evident that this species does not go into Smith Sound in large numbers during its remarkable migratory absence from its usual haunts, as none were seen at Sabine during our year there.

No. 15. *Erignathus* (*phoca*) *barbatus* (Fab.).—This seal has been previously obtained in Thank God Harbor and Discovery Bay. The experience of Bessels and of my own party leaves no doubt that it winters in Robeson Channel. One was shot as late as November 4th, in 1871, and as early as March 18, 1872. A seal-hole was discovered by us near Distant Cape, in April, 1883, which had certainly been open for some time. Five seal were obtained near Distant Cape in May, 1882 ; seal-holes were first observed on the 15th, and a seal first killed two days later. The most northerly specimen seen was near Cape Murchison, about 81° 46′ N., at the entrance of St. Patrick Bay. The largest seal obtained by us weighed six hundred and forty pounds, and was eight feet two and a half inches in length. One obtained at Thank God Harbor by the Polaris party was estimated at fifteen hundred weight.

No. 16. *Odobænus* (*trichochus*) *rosmarus* (Linn.).—The walrus was seen by Nares' expedition as far north as Cape Fraser, and was obtained in the vicinity of Norman Lockyer Island. The most northerly specimen observed by us was seen in August, 1883, about ten miles south of Cape Hawks. The difficulty of killing this animal without lance and line was illustrated to our misfortune in Baird Inlet during October, 1883. Private Long and Eskimo Christiansen put two bullets into the vital parts of a walrus from a distance of a few yards. Blood poured from the animal in torrents, but he was able to reach the edge of the floe and roll into the water. A few days later Private Long killed a walrus in the water, which floated three or four minutes only. Baird Inlet appeared to be a favorite feeding-ground for these animals. In May, 1883, Lieutenant Lockwood and his party saw in open water, near the head of Greely Fiord, what was thought to be a walrus, Sergeant Brainard and Eskimo

Christiansen inclining to the same opinion. From a distance they were unable to determine positively, although it was examined through the glass. Frequent examples of the walrus were seen between Capes Hawks and Sabine in September, 1883.

No. 17. *Cystophora cristata* (Nills.).—A bladder-seal was killed by us in the middle of Kane Sea, September 20, 1883. One or two other seals of this species were seen in about the same place. The animal killed weighed probably over six hundred pounds, and was eight feet four and a half inches in length.

Distribution of Mammalia in, and northward of, Kennedy Channel.

Highest latitude reached.	Name.*	North of 81°.		Remarks.
		Migratory.	Indigenous and present all the year.	
83° 03′	Thalassarctos (ursus) maritimus	Yes.	.....	
83° 24′	Vulpes lagopus	.....	Yes.	
82° 50′	Canis lupus	.....	Yes.	
82° 30′	Putorius (mustela) ermínea	.....	Yes.	
83° 24′	Cuniculus (myodes) torquatus	.....	Yes.	
83° 24′	Lepus arcticus (glacialis)	.....	Yes.	
83° 03′	Ovibos moschatus	.....	Yes.	Traces at Cape Benet.
82° 45′	Rangifer tarandus	.....	†	† Probably near Radmore Harbor, 80° 27′ N. Antler found.
82° 58′	Phoca fœtida	.....	Yes.	
81° 30′	Phoca grœnlandica	Yes.	.....	
81° 46′	Erignathus (phoca) barbatus	.....	Yes.	
79° 40′	Odobœnus (trichochus) rosmarus	.....	‡	‡ Probably around Bache Island.
79° 15′	Cystophora cristata	.....	§	§ Probably around Bache Island.
.....	Balæna mysticetus	.....	.....	Rib found in 82° 33′. Probably this whale in the present day goes to about 74° N.
81° 35′	Orca gladiator	Yes.	.....	In favorable and exceptional years.
81° 35′	Beluga catodon	Yes.	.....	
81° 35′	Monodon monoceros	Yes.	.....	

* The nomenclature of animals and birds as given in the "Arctic Manual" has been followed in the narrative. In adopting a partly new nomenclature for the Appendices, the old name has been kept in brackets so as to avoid confusing the general reader. A. W. G.

APPENDIX VIII.

ORNITHOLOGY.

By Lieutenant A. W. Greely.

In the "Arctic Manual," Professor Newton, on birds in Greenland, has pointed out that at the highest sixty-three species may be called denizens, and sixty-two stragglers, in Greenland. Of the regular denizens, forty-seven are recorded as inhabiting Northern Greenland, of which number he expected thirty might be found in Smith Sound; a number corresponding to the known species in Spitzbergen. He mentioned thirty-six to which attention should be particularly directed as being the greatest possible number.

The observations of the various expeditions confirm the general estimate advanced by Professor Newton. Thirty-five birds have been found in or to the northward of Smith Sound. Thirty-two have been recorded north of 81° 30′ N. (eight of which can be called stragglers), or two more species than have been reported from Spitzbergen a degree of latitude to the south.

As far as practicable I have collated data, from various reports and narratives, which will be found in the attached table, showing the arrival and departure of the different species. My own data the first year were incomplete in this and many other respects, but the table is made as full as possible in the hope that it may be of interest if not of value.

No. 1. *Urinator lumme* (Gunn.) [= Colymbus septentrionalis].—Red-throated Diver. The most northerly specimen of the bird is undoubtedly that seen by Feilden, on September 2, 1875, at Floeberg Beach, 82° 27′ N. The bird was not positively identified, but was supposed to be of this species. A pair of these birds was seen by us July 18, 1883, near Dutch Island; and a specimen was obtained by Sergeant Brainard, at Cape Baird, June 18, 1883.

No. 2. *Fratercula arctica* (Linn.).—Puffin. Newton speaks of the

puffin as not common in Greenland. A specimen was obtained by us, July 31, 1881, at Littleton Island. The bird has been observed by no other expedition in Smith Sound.

No. 3. *Cepphus Mandtii* (Licht.) [= Uria grylle].—Black Guillemot, or Sea-Pigeon. The sea-pigeon was a common bird around the cliffs of Cape Lieber, and was occasionally seen near Distant Cape. Feilden reports it as feeding in pools as far north as latitude 82° 33′, but he does not think that it breeds north of Cape Union. The earliest specimens seen by us were June 9, 1882, and June 4, 1883. It was seen near Thank God Harbor February 28, 1872, and frequently in March. On May 26, 1876, one was seen by a sledge party at Thank God Harbor. The latest in that vicinity was observed near Floeberg Beach, 83° 27′ N., August 29, 1875. Hayes speaks of flocks at Port Foulke from February 10 to 17, 1861, and after September 1, 1860. At Cape Sabine the first specimen seen was March 15, 1884, in winter plumage. There is not much doubt that the bird is found as far northward in Smith Sound, and as late in the year, as open water is to be found near the precipitous cliffs.

No. 4. *Uria troile* (Linn.), or *Uria lomvia* (Linn.) [= Lomvia bruennichii, or arra].—Bruennich's Guillemot, or Murre. The most northward specimen observed by the expedition of 1875 was in Buchanan Strait, 79° N., which agrees with our own experience. The most northward example obtained by us in 1881 was at Littleton Island, and in 1884 north of Cape Sabine, on June 11th. Bessels speaks of it north of 81° as "quite abundant and nesting."

No. 5. *Alle alle* (Linn.) [= Mergulus alle].—Little Auk, or Rotge, or Dovekie. The little auk was not observed by our expedition north of Buchanan Strait, where it was last seen by the Arctic expedition of 1875. I concur in Feilden's opinion that they do not breed to the north of Foulke Fiord. Two of these birds were observed in Newman Bay in 1872. Bessels observed it, May 24–26, 1873, at Polaris house; and Hayes reports a specimen as seen after September 1, 1860, and during his boat journey near Cape Parry, September 11, 1854. The important part which this bird plays in the food-supply of the Arctic Highlanders has been pointed out by Kane, Hayes, and Bessels. This bird was seen by Parry, in 1827, to 82° 45′ N. One was shot off Bedford Pim Island, in Buchanan Strait, June 4, 1884.

No. 6. *Stercorarius parasiticus* (Linn.).—Common Skua, or Parisitic Jaeger. The common skua was obtained at Thank God Harbor in 1872. But two were seen by us; they were noted June 18 and 20, 1883, by different observers. None were reported by the English expedition of 1875–76.

No. 7. *Stercorarius longicaudus* (Vieill.).—Buffon's Skua, or Long-tailed Jaeger. This was the most common bird in the vicinity of Discovery Harbor. Nearly two hundred were killed by us at Conger, in 1882, as food for young owls. One was seen June 6, 1876, at Depôt Point, about 82° 40′ N. The first seen by us was June 3, 1882, and a day later in the month the following year. The first specimen at Sabine was observed May 23, 1884. This bird fed very largely on lemmings. Our observations were the same as Feilden's, who says: "It lays its two eggs in a small hollow in the ground, and defends its nest with the utmost bravery." Many specimens were seen by me in the interior of Grinnell Land, in July, 1882, when the bird was so bold as to be troublesome when we were in camp.

No. 8. *Gavia alba* (Gunn.) [= Pagophila eburnea].—Ivory Gull. The only specimen killed by us was August 7, 1881, in Hall Basin, and not more than three or four specimens were seen in our two years at Fort Conger. Feilden says that in 1875 and 1876 this gull was not infrequently observed, but not beyond latitude 82° 20′ N. One was seen as late as September 1, 1876, in Lincoln Bay, 82° 6′ N. The earliest specimen noted was by Coppinger, in Petermann Fiord, May 28 (?), 1876.

No. 9. *Rissa tridactyla* (Linn.).—Kittiwake. The kittiwake was obtained September 12, 1871, at Thank God Harbor; and Bessels says it was the last bird observed near the ship in 1871, and that flocks were seen, June, 1872, in Newman Bay. The expedition of 1875–76 did not observe this bird to the northward of Port Foulke. A pair was seen by us June 23, 1883, at Distant Cape.

No. 10. *Larus glaucus* (Brünn.).—Glaucous Gull. Feilden mentions this gull as seen to 82° 34′ N., and until September 1, 1875. It was seen two days later in 1872 at Thank God Harbor. The earliest specimen noted by us was June 5, 1883. At Polaris house, about 78° 20′ N., it was seen as early as May 10, 1873. At Thank God Harbor it appeared June 12, 1872. The gull was not an un-

common one in the vicinity of Fort Conger, but no breeding-place was ever discovered, although carefully sought for.

No. 11. *Larus leucopterus* (Faber.).—Iceland Gull. This bird is evidently an infrequent visitor of Smith Sound. Newton says it breeds in both inspectorates of Greenland, and is the most common gull after the kittiwake. He also says it has been observed on the east coast, and is said to breed in the Parry Islands. Two specimens were seen; one by myself, May 19, 1882, in Watercourse Bay, and the second, June 5, 1883, by Connell, at Distant Cape. The bird was identified simply by its small size and pale blue mantle. Those seen were evidently stragglers.

No. 12. *Xema sabinii* (Sab.).—Sabine's Gull. The Sabine gull was first obtained by Bessels in Smith Sound in 1871. Probably the most northern specimen ever killed was at Fort Conger, July 6, 1882. The gull was an exceedingly uncommon one, and the few specimens seen were in company with Buffon's skuas.

No. 13. *Sterna paradisæa* (Brünn.) [= Sterna macrura].—Arctic Tern. The tern was found breeding on Breakwater Island, adjoining Bellot Island, by Feilden, in 1875, and by us at the same place. The bird was not uncommon in the vicinity of Fort Conger, and was not especially shy. The first tern appeared near Floeberg Beach, June 16, 1876. The first seen by us was June 21, 1882, and one was killed June 18, 1883; both specimens in or near The Bellows, eighteen miles southwest of Fort Conger. It was observed, June 21, 1854, by Morton at Cape Constitution. It was seen as late as August 26, 1875, at Discovery Harbor, which is probably a late date for it to remain in Smith Sound, as Kane speaks of it as gone September 10, 1853.

No. 14. *Fulmarus glacialis* (Linn.) [= Procellaria glacialis].—Fulmar, or Mallemuke. This bird is evidently an infrequent visitor of Kennedy and Robeson Channels. A single specimen was seen north of Floeberg Beach by Feilden, in 82° 30′ N., and one was found dead near by a few days later by Lieutenant Egerton. Bessels speaks of the bird, September 19, 1872, as rarely seen. Morton reports it as one of the species observed, June 22, 1854, at Cape Constitution. Parry saw this bird, July 16, 1827, in 82° 27′ N., on the meridian of Spitzbergen, and later about 82° 45′ N.

No. 15. *Clangula hyemalis* (Linn.) [= Harelda glacialis].—Long-tailed Duck, or Old Squaw. Specimens were obtained at Floeberg

Beach, 82° 27′ N., by Feilden as late as September 16, 1875. He speaks of the bird as found in numbers the following summer. They were not uncommon in the vicinity of Discovery Harbor and the interior of Grinnell Land. The earliest specimens obtained by us were taken June 6, 1883, and June 17, 1882. Kane speaks of the bird as arriving June 16, 1854, at Van Rensselaer Harbor. At Cape Sabine the first specimen was observed by us June 1, 1884. The breeding plumage of the male is wonderfully varied, scarcely two examples ever being alike.

No. 16. *Somateria mollissima* (Linn.).—Eider. The eider duck was seen in considerable numbers in the vicinity of Discovery Harbor. It was not obtained by Feilden north of Cape Union, but a flock was observed, September 5, 1875, at Dumb-bell Bay, about 82° 30′ N. A flock of ten, caught by the early winter, was killed by us, September 7, 1881, in the southwestern part of Discovery Harbor. Our experiences tend to confirm Kumlein's observations in Cumberland Sound, that after the breeding season the males separate from the females and migrate southward earlier than the mother-birds and their broods. A flock was seen at Thank God Harbor as early as June 4, 1872, and in 79° N. as late as November 4, 1872. The first eiders at Sabine were observed May 28, 1884.

No. 17. *Somateria spectabilis* (Linn.).—King Eider. Feilden saw this species as far north as Floeberg Beach, 82° 27′ N., near the end of June, 1876. The earliest specimens seen by us were on June 11, 1883, five days earlier than in the preceding year. At Thank God Harbor it was killed June 12th, and a duckling seen July 15, 1872. At Cape Sabine it made its appearance May 26, 1884. The latest reported specimens are mentioned by Hayes, near Cape Parry, September 21, 1854.

No. 18. *Chen hyperborea nivalis* (Forster) [= Chen hyperboreus]. —Greater Snow-Goose. This bird has not been previously obtained in Smith Sound or to the northward. A pair was seen June 12, 1882, by Private Connell, near Fort Conger, and by Lieutenant Lockwood, June 13, 1882, on the shores of Sun Bay.

No. 19. *Branta bernicla* (Linn.) [Bernicla brenta].—Brent Goose, or Brant. Feilden found this bird breeding in 82° 33′ N. It was comparatively numerous in the vicinity of Discovery Harbor, but very wary. The earliest specimens seen were at Thank God Har-

bor June 4, 1872. At Cape Sabine it was first observed May 30, 1884. At Thank God Harbor specimens were obtained as late as September 6, 1871.

No. 20. (?) *Grus canadensis* (Linn.).—Little Brown Crane. This species is mentioned doubtfully. Two strange birds were seen, June 23, 1883, in The Bellows, about 81° 40′ N., by one of my most reliable and observant men, Private Bierderbick. He was distant about two hundred yards from them. Their backs were whitish, with an ashy or silvery gray effect, and the long legs seemed to be reddish. The birds attracted his attention by a peculiar noise, which he thought was made by "clapping" their bills. When alarmed they rose with difficulty, making much ado with legs and wings, and flew slowly and heavily.

No. 21. *Crymophilus fulicarius* (Linn.) [= Phalaropus fulicarius.—Gray Phalarope. Feilden obtained a female June 20, 1876, in 82° 27′ N. But very few specimens were seen by us, the earliest June 18, 1883. One was killed June 26, 1883, at Distant Cape, and a second July 2, 1883, at Cape Baird.

No. 22. *Tringa canutus* (Linn.).—Knot. It appears probable that the favorite breeding-place of this bird is in the neighborhood of the Parry Islands. Captain Sabine found it nesting in large numbers, in 1820, on Melville Island. Major Feilden finds that it was obtained in Cambridge Bay, 69° N., 105° W., in July, 1853. Murdoch's experience at Point Barrow tends further to confirm this opinion. The bird was rare in that locality, but a "female was taken on July 11, 1882, with full-sized yolks in her ovaries." The bird breeds in small numbers in the vicinity of Discovery Harbor, but it was exceedingly wary, and we never obtained the nest. I not only spent hours in watching a nesting-bird, but had several of my most patient hunters occupied on similar duty, with no success. I have no doubt twenty pairs nested within a couple of miles of Fort Conger. They arrived June 3, 1883, and immediately nested. The young were killed July 31st. On June 9th I directed that a few knots be killed for specimens, having before ordered that they be undisturbed until the nest was found. That day Sergeant Ralston shot a female. There were in the egg-sac twenty-one eggs in all stages of growth. One was a completely-formed hard-shelled egg ready to be laid. A shot had broken in the shell at one point, but it was not sufficiently injured to prevent measurement. The egg

was 1.10 inch (28 mm.) in the longer axis, and 1.0 inch (25.40 mm.) in the shorter. The ground-color was light pea-green, closely spotted with brown in small specks, about the size of the head of an ordinary pin. The next-sized egg was without shell, round, bright orange color, veined with deep red. Feilden has described the soaring of these birds, and the peculiar whirring noise they make.

No. 23. *Tringa maritima* (Brünn.).—Purple Sandpiper. This species was observed by Bessels near Thank God Harbor. A few specimens were seen and obtained by us in 1882–83.

No. 24. *Calidris arenaria* (Linn.).—Sanderling. Feilden reports seeing a sanderling June 6, 1876, in company with knots and turnstones. He says that the bird was rare, but he obtained several pairs and two eggs, a plate containing illustrations of which is to be found in the Feilden Ornithology in "Nares' Voyage to the Polar Sea." The nest, found June 24th, in 82° 33′ N., was on a gravel ridge, at an altitude of several hundred feet above the sea, and the eggs were deposited in a slight depression in the centre of the recumbent plant of willow, the lining of the nest consisting of a few withered leaves and some of the last year's catkins. A specimen was seen June 4, 1876, at Depôt Point. The bird was not obtained by us unless, as is probable, it was one of our unidentified specimens, obtained August 31, 1882, of which my naturalist unfortunately made no note.

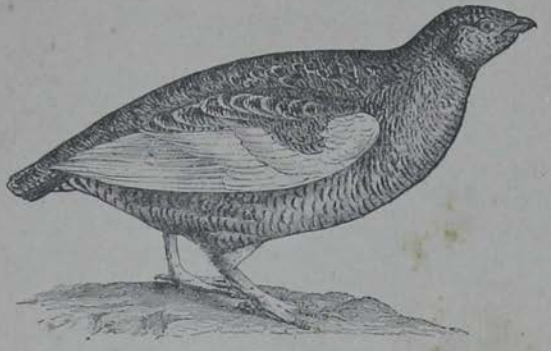
No. 25. *Ægialitis hiaticula* (Linn.).—Ringed Plover. Feilden reports a specimen obtained August 4, 1875, in Twin Glacier Valley. Five plovers, evidently of this species, were found breeding on the banks of Very River, in the interior of Grinnell Land, about 81° 35′ N., 74° W., July 1, 1882.

No. 26. *Charadrius dominicus* (Mull.) [= Charadrius virginicus dominicus.]—Golden Plover. This bird was seen by Mr. Clay, who was familiar with it, flying over the Proteus, near Cape Baird, August 7, 1881. It had been previously recorded, I believe, by Bessels at Thank God Harbor.

No. 27. *Arenaria interpres* (Linn.) [= Strepsilas interpres].—Turnstone. The turnstone was quite abundant near Fort Conger. On May 27, 1876, it was first seen by Markham near Cape Henry. The earliest specimen noted by us was seen by Sergeant Brainard, June 2, 1883, at Cape Baird. September 11, 1875, a flock was observed

near Depôt Point, about 82° 45′ N. The young were able to fly by July 9th.

No. 28. *Lagopus rupestris* (Gmel.).—Rock Ptarmigan. This is the only Greenland ptarmigan which is common to the whole country. It breeds in great abundance on the Parry Islands, and is found thence southwestward to Point Barrow, where it is a rare species. This bird is no doubt a winter habitant of Grinnell Land. Traces of it were seen near Floeberg Beach September 29, 1875, and a specimen was obtained in Discovery Harbor (Fort Conger) October, 1875. Seven were seen by us October 2, 1881, all in perfect winter plumage, and a single specimen October 12, 1882. It was



Rock Ptarmigan.
[*The only winter bird of Grinnell Land.*]

observed at Thank God Harbor March 24, 1872, and killed in Discovery Harbor April 10, 1876. The earliest seen by us were four in winter plumage, March 9, 1882, in Newman Bay. One was killed on Lake Hazen April 30, 1882. Traces were found by Aldrich at Cape Columbia, 83° 06′ N., and the bird was killed by Lieutenant Lockwood near Cape Frederick, 83° 03′ N., on the North Greenland coast, May 5, 1882, and traces were noticed in 83° 24′ N., at Lockwood Island. It was also the bird seen by me farthest in the interior of Grinnell Land, near Mount Arthur, July, 1882. Tracks were seen at Life-Boat Cove February 7, 1873, and at Camp Clay March 11, 1884, where three days later several were killed.

No. 29. *Haliæetus albicilla* (Linn.).—White-tailed Eagle, or Gray

Sea-Eagle. This eagle is one of the birds which was not expected in Smith Sound, never having been reported as far north as Littleton Island. Newton says its northern range is not as yet determined. A specimen was seen by Lieutenant Lockwood, April 4, 1882, in Shift-Rudder Bay, near Cape Beechy, about 81° 55′ N. It was identified by Eskimo Christiansen, who knew the bird well, and who instantly gave it the Eskimo names (Nektoralik and Tertersoak). It was evidently a straggler, and was the earliest individual seen that year. The same bird was probably seen by Lieutenant Kislingbury near Fort Conger seven days later; it being, he said, "a hawk or an eagle." Sergeant Gardiner, who heard the bird, said that its scream was that of an eagle. Lieutenant Lockwood saw a second eagle, April 18, 1882, at the head of Lost River, near Repulse Harbor, about 82° N., 58° W.

No. 30. *Falco islandus* (Brünn.) [= Falco candicans].—Greenland Falcon, or Gyrfalcon. The Greenland falcon was probably seen by the Polaris Expedition about May 22, 1872. Mr. Hart noticed these birds nesting in cliffs near Cape Hayes, 79° 42′ N., and a falcon was seen near Cape Frazer, 79° 44′ N., August 24, 1876. The latest specimen in Smith Sound was recorded by Hayes during his boat journey, near Cape Alexander, September 10, 1854. We saw one August 4, 1881, just north of Carl Ritter Bay, and another near Fort Conger on July 30, 1882; the attention of Sergeants Jewell and Ralston being called to it through the great alarm of the Buffon's skuas. Three falcons were seen August 13, 1882, in the valley at the head of St. Patrick Bay, about 81° 55′ N., attracted by offal. They were in the same locality August 15th, and a pair of them flew around Fort Conger two days later.

No. 31. *Nyctea nyctea* (Linn.) [= Nyctea scandiaca].—Snowy Owl. The snow-owl is a common and early migrant to Grinnell Land, and remains until the late autumn. Lieutenant Parr noted one as early as March 29, 1876, near Floeberg Beach, and one was seen by us at Fort Conger October 17, 1882, and by Hall at October 20, 1871. On May 20, 1884, an owl (?) flew northward over our hut near Cape Sabine. Major Feilden reports finding a specimen in Grinnell Land, 82° 40′ N.; probably the most northerly record of this species. The bird bred abundantly in the vicinity of Fort Conger, and as many as fifteen or twenty fine young birds were raised by us until approaching winter compelled us to re-

lease them. A nest near Fort Conger resembled that described by Major Feilden, which was "a mere hollow scooped out of the earth, and situated on the summit of an eminence which rose from the centre of the valley." In this case a few feathers and a little grass were present. Our observations agreed with that officer's to the effect that the food of this bird seems to consist entirely of the lemming. Nelson has noticed that the abundance of the owl in spring and summer near Point Barrow appears to depend upon the

Arctic Owl.

presence of its favorite food, the lemming. A specimen killed by us, September 9, 1882, measured four feet eight and one-half inches between the extreme tips of the wings, and weighed only three pounds and fifteen ounces. Eggs were obtained by us May 25th, and the young on July 8th.

No. 32. *Corvus corax sinuatus* (Wagl.) [= Corvus corax].—Raven. Dr. Coppinger observed a pair of ravens nesting at Cape Lupton, July, 1876, which Feilden considers its most northern settlement. This point was probably a favorite nesting-place, as the Polaris party saw a specimen near there July 20, 1872. The raven was but oc-

casionally seen in the neighborhood of Fort Conger. On September 28, 1882, Private Bierderbick shot a fine specimen, in good condition, which weighed four pounds and twelves ounces, and was four feet four and a half inches from tip to tip of wings. It is probable that this bird winters in the immediate vicinity of Cape Sabine, as specimens were seen near Polaris house, Life-Boat Cove, late in November, 1872, and on January 30 and February 15, 1873. At Sabine a raven remained with us until some time in November, 1883, and reappeared February 20, 1884.

No. 33. *Plectrophenax nivalis* (Linn.) [= Plectrophanes nivalis].—Snow-Bunting. This is said by Pansch to be the most common land-bird on the eastern coast of Greenland, and the same remark applies to it in Grinnell Land. Murdoch also found it the com-

The Snow-bunting.

monest bird at Point Barrow, where the first bird, a male in full breeding plumage, appeared April 9, 1882. Feilden, August 28, 1875, observed a flock of about eighty. A specimen, evidently a straggler, was seen by the Polaris party at Thank God Harbor March 14, 1872. The first at Conger appeared April 14, 1882, and ten days later the following year. The first bird near Cape Sabine was seen April 13, 1884, in Rice Strait. The last observed by Feilden at Floeberg Beach was September 24, 1875. Kane at Van Rensselaer Harbor reported the last seen November 4, 1853, and the first on May 1, 1854. Feilden found the species nesting in 82° 33′ N., and Lieutenant Parr saw one near the eighty-third parallel. Lieutenant Lockwood and Sergeant Brainard saw several specimens at 83° 24′ N., May 13–15, 1882, and numerous others to the southward. Eggs, nests, and young were obtained by us.

No. 34. *Saxicola œnanthe.*—Stone-Chat or Wheat-Ear. This is one of the stragglers not expected in Smith Sound. Newton says it was seen by James Ross, May 2, 1830, in Felix Harbor, 70° N., 92° W. Observed July, 1876, at Port Foulke, about 78° 15′ N., by Dr. Horner in yacht Pandora.

HYPOTHETICAL LIST.

No. 35. *Urinator imber* (Gunn.) [= Colymbus torquatus].—Great Northern Diver, or Loon. This bird Newton does not class as probable in Smith Sound. Hayes, in his "Boat Journey," speaks of the great northern diver as seen June 18 and September 20, 1854. Whether he mistook the red-throated diver for this bird or not is uncertain. I include it in the list, it being a possible straggler, as Kumlein reports it as breeding in Cumberland Sound.

No. 36. *Stercorarius pomarinus* (Temm.) [= Stercorarius pomatorhinus.]—Pomatorhine Skua, or Pomarine Jaeger. This gull was not observed by us. This is somewhat surprising, as Newton says it is the commonest species of skua in the north inspectorate of Danish Greenland.

No. 37. *Rhodostethia rosea* (Macgil.).—Ross' Gull. No specimen of this rare bird was seen by us in Smith Sound. The observations of Murdoch at Point Barrow show that this bird, in thousands, passes over that point to the northeast during October, none of which were ever seen to return. He says: "They appeared to come in from the sea to the west or northwest, and travel along the coast to the northeast."

No. 38. *Merganser serrator* (Linn.).—Red-breasted Merganser. This bird was not seen by us nor by any of the preceding expeditions in Smith Sound or northward, although considered by Newton as a possible migrant.

No. 39. *Phalaropus lobatus* (Linn.) [= Phalaropus hyperboreus.] —Northern Phalarope. The red-necked phalarope, which Newton says is the commonest species in Greenland, was not observed by us.

No. 40. *Charadrius squatarola* (Linn.) [= Squatarola helvetica]. —Gray Plover, or Black-bellied Plover. The gray plover was not seen by us, nor has it been recorded in Smith Sound, although it is a possible species according to Newton.

LIST OF BIRDS OBSERVED TO THE NORTHWARD OF LATITUDE 81° 30′ N., IN GREENLAND AND GRINNELL LAND, 1871–72, 1875–76, AND 1881–83.

No.	Species.	English Name.	Also found in			Years seen.	Earliest date seen.	Average arrival in —— years.	Last seen.
1	Urinator lumme	Red-throated Diver	Z	S	B	2	July 18, 1883	.....	Sept. 21, 1875
2	Cepphus mandtii	Mandt's Guillemot	..	S	B	5	Feb. 28, 1872	3 June 3d	August 29, 1875
3	Uria troile, or lomvia	Murre	Z	S	..	1	Feb. 28, 1872	.....	.....
4	Alle alle	Dovekie	Z	S	..	1	Feb. 28, 1872	.....	.....
Stg. 5	Stercorarius parasiticus	Parasitis Jaeger	Z	S	B	2	June 18, 1883	.....	.....
6	Stercorarius longicaudus	Long-tailed Jaeger	..	S	B	6	June 3, 1882	4 June 7th	August 30, 1882
7	Gavia alba	Ivory Gull	Z	S	B	4	May 28, 1876	2 June 5th	Sept. 1, 1875
8	Rissa tridactyla	Kittiwake	Z	S	..	3	June 21, 1883	.....	Sept. 12, 1871
9	Larus glaucus	Glaucous Gull	Z	S	B	6	June 5, 1883	4 June 10th	Sept. 6 (?), 1871
Stg. 10	Larus leucopterus	Iceland Gull	Z	..	..	2	May 19, 1882	2 May 28th	.....
Stg. 11	Xema sabinii	Sabine's Gull	..	S	B	2	June 6, 1882	.....	.....
12	Sterna paradisæa	Arctic Tern	Z	S	..	6	June 16, 1876	3 June 18th	August 26, 1875
Stg. 13	Fulmarus glacialis	Fulmar	Z	S	..	2	June 26, 1876	.....	.....
14	Clangula hyemalis	Old Squaw	Z	S	B	5	June 6, 1883	2 June 12th	Sept. 16, 1875
15	Somateria mollissima	Eider	Z	S	..	6	June 4, 1872	3 June 16th	Sept. 7, 1881

16	Somateria spectabilis.....	King Eider.....	Z	S	B	6	June 16, 1883	3	June 13th	.....
Stg. 17	Chen hyperborea nivalis.....	Greater Snow-Goose...	..	..	..	1	June 12, 1882		.....	.....
18	Branta bernicla	Brant.....	Z	S	..	5	June 3, 1882	4	June 7th	Sept. 6, 1871
Stg. 19	Grus canadensis.....	Little Brown Crane....	..	..	..	1	June 23, 1883		.....	.....
20	Crymophilus fulicarius	Gray Phalarope.....	..	S	B	2	June 18, 1876	2	June 19th	.....
21	Tringa canutus	Knot.....	..	..	B	5	June 3, 1883	3	June 6th	August 25, 1875
22	Tringa maritima	Purple Sandpiper.....	Z	S	..	3	.....		.....	About Sept. 3, 1871
23	Calidris arenaria	Sanderling	Z	..	..	3	June 4, 1876		.....	Aug. 31, 1882 (?)
24	Ægialitis hiaticula.....	Ringed Plover.....	Z	S	..	1	July 1, 1882		.....	.....
Stg. 25	Charadrius dominicus	Golden Plover.....	..	..	B	1	.....		.....	August 7, 1881
26	Arenaria interpres	Turnstone.....	Z	..	B	6	May 27, 1876	3	June 1st	Sept. 11, 1875
27	Lagopus rupestris.....	Rock Ptarmigan.....	..	..	B	7	March 9, 1882	A winter denizen		Oct. 12, 1882
Stg. 28	Haliætus albicilla	Gray Sea-Eagle.....	Z	..	..	1	April 4, 1882		.....	.....
29	Falco islandus	Gyrfalcon.....	Z	S	B	*2	May 22, 1872		.....	About Oct. 20, 1871
30	Nyctea nyctea	Snowy Owl.....	Z	S	B	7	March 29, 1876	4	April 25th	Oct. 20, 1871
31	Corvus corax sinuatus.....	Raven	..	..	..	3	June 19, 1872		(?)	Sept. 28, 1882
32	Plectrophenax nivalis	Snow-Bunting.....	..	..	..	7	March 14, 1872	†4	May 2d	Sept. 24, 1875
			21	21	16					

Explanations: Stg., for Straggler; Z, for Nova Zembla; S, for Spitzbergen; B, for Point Barrow.

* Seen four years north of 79° 43′.

† Not including average earliest arrival in 1872.

APPENDIX IX.

BOTANY.

By Lieutenant A. W. Greely.

The botanical collection of the Lady Franklin Bay Expedition was made under many disadvantages, as there was no officer able to identify more than half a dozen species of Arctic plants. Great care and attention was paid by me personally to this work the second year, and as a result over sixty species were collected, several of which escaped the observation of the trained naturalists of the British Expedition of 1875–76. The specimens brought back have been identified by, and through the courtesy of, Professors Asa Gray and S. Watson, of Harvard University, and Dr. George Vasey, of the Department of Agriculture. The appended remarks are drawn almost entirely from my private journal.

Plants collected in the summers of 1882 and 1883, by Lieutenant A. W. Greely and members of the Lady Franklin Bay Expedition, in the vicinity of Fort Conger, Grinnell Land, situated in latitude 81° 44′ N., longitude 64° 45′ W. :

No. 1. Ranunculus nivalis, R. Br.; var. sulphureus, Wahl. In bloom June 17th ; grows from the sea-level to 1,800 feet altitude, on loamy or swampy soil ; did best among mosses and ferns ; the largest specimen 6¾ inches high.

No. 2. Ranunculus affinis, R. Br. In bloom June 19th ; on moist loamy ground ; not found at a less elevation than 1,800 feet ; specimens about 5 inches high.

No. 3. Papaver nudicaule, L. In flower June 17th ; grew from sea to 1,900 feet altitude ; found on all soils, but did best on hard, dry ground ; color of flower varied from deep saffron to a yellow-

ish white, in some specimens no color except faint yellow at very centre.

No. 4. Draba alpina, Linn. In flower June 16th.

No. 5. Draba borealis, D.C. In flower June 16th; 2 to 4 inches high.

No. 6. Draba hirta, L., Jacq. Specimens 2 to 3 inches high.

No. 7. Draba rupestris, R. Br.

No. 8. Vesicaria arctica, Richards. In bloom June 13th; from sea-coast to 1,000 feet altitude; grew generally on granitic or stiff clay, doing best on the latter soil; roots very long and deep; the largest specimen 4 inches high, and spreading 6 or 7 inches wide.

No. 9. Cochlearia officinalis (?); C. fenestra, R. Br. From sea-level to 100 feet altitude; found generally along moist shores of brooks; specimens from 1 to 4 inches high.

No. 10. Braya alpina, Sternb. var. In part.

No. 11. Cheiranthus pygmæus, Adams; Hesperis pygmæas, Hook. In bloom June 8th; from 50 to 1,000 feet altitude, usually on very rocky soil; all specimens had very long roots, were generally young, and rarely 2 inches high. A few were found with the stem and pods of two years' preceding growth; one of these is 6 inches high. A few peculiar examples were found on very rocky soil, from 700 to 1,000 feet elevation, which were from 2 to 4 inches high.

No. 12. Parrya arenicola, Hook. f. (?).

No. 13. Eutrem Edwardsii, R. Br.

No. 14. Cardamine pratensis, Linn. No flowers; found in mossy soil at about 1,000 feet elevation.

No. 15. Lychnis apetala, Linn. In bloom June 30th; from the sea-coast to 1,000 feet altitude, in rocky soil; the specimens are from 1 to 5 inches high; usually 1 flowered, occasionally with 2 or even 3 flowers.

No. 16. Lychnis triflora, R. Br. With and similar to the preceding, the culm and leaves more pubescent, the leaves broader and obtuse; mostly 1 flowered, rarely 2 or 3.

No. 17. Stellaria longipes, var. Edwardsii, T. and G. In bloom June 14th; from the sea to 1,000 feet altitude, on loamy soil and among mosses; *2 to 4 inches high.*

No. 18. Cerastium alpinum, Linn. *In bloom June 6th; from the* coast to 800 feet altitude, doing best on loamy soil; the largest specimen obtained, 4½ inches high; the peduncles were usually 1, rarely 3, flowered.

No. 19. Arenaria verna, Linn. 1 to 2 inches high; 200 to 1,000 feet altitude, on rocky soil.

No. 20. Arenaria groenlandica, Spris. (?).

No. 21. Dryas octopetala, var. integrifolia, Ch. and Schl. In bloom June 16th; from the coast to 1,500 feet altitude; the specimens are 1 to 2 inches high; the leaves mostly entire, sometimes minutely toothed. The plant was the most common one; beds of acres in extent were found on loamy soil, especially in the interior of Grinnell Land. Some specimens had 22 petals; both the whole-leafed and dentated specimens were found.

No. 22. Potentilla nivea, Linn. From the coast to 1,000 feet altitude, on rocky soil; specimens from 2 to 5 inches high.

No. 23. Potentilla pulchella, R. Br.

No. 24. Potentilla masculata, Pour.

No. 25. Saxifraga rivularis, L., var. hyperborea, Hook.

No. 26. Saxifraga flagellaris, Willd. In bloom June 19th; from 1,200 to 1,800 feet altitude, on moist loam or in the beds of brooks; generally but 1 flowered, rarely 3 flowered.

No. 27. Saxifraga tricuspidata, Retz. Plentiful at from 800 to 1,900 feet altitude; not found below 800 feet; grew best on rocky soil; specimens 2 to 4 inches high; generally 1 flowered, but occasionally 3 or 4.

No. 28. Saxifraga cernua, Linn. From 200 to 1,800 feet altitude, in beds of moss and lichens or by the sides of brooks; specimens 3 to 8 inches high.

No. 29. Saxifraga oppositifolia, Linn. In bloom June 1st; only less common than dryas; from the coast to 1,900 feet altitude; grew best on loamy soil; flowers 4 to 9 petaled, varying from faint pink to dark purple.

No 30. Saxifraga nivalis, Linn. In bloom June 23d; not very common; found only between 800 and 1,200 feet altitude; grew best in damp, mossy soil; specimens mostly 2 to 3 inches high, some found as high as 6 inches.

No. 31. Saxifraga cæspitosa, Linn.

No. 32. Epilobium latifolium, Linn. From the coast to 1,200 feet altitude; found only on rocky soil, in the beds of brooks and in spots having southern exposure; specimens from 2 to 4 inches high; generally 1 flower, sometimes 3 or 4.

No. 33. Erigeron uniflores, L. In bloom June 23d; from the

sea to 800 feet altitude, on loamy and rocky soil, doing best on the latter and at the greatest elevation; specimens near the sea about 2 inches high, at higher points from 3 to 5 inches.

No. 34. Erigeron compositus, var. trifidus, Gray. In bloom June 25th; from 100 to 800 feet altitude; specimens from 1 to 3½ inches high; generally with a single stem and flower, occasionally 2 or 3 flowering stems from one root; late in the season flowers sometimes faded to a pinkish color.

No. 35. Arnica alpina, Olin. From the coast to 1,500 feet altitude, in rocky and clay soil; grew best on rocky soil; the specimens near the sea flowered late, and rarely more than 2 inches high; the best found grew at about 700 feet altitude; the largest were about 6 inches high.

No. 36. Taraxacum officinale, var. pallida, Koch. In bloom in June; from the coast to 200 feet altitude, on loamy and clay soil; 2 to 4 inches high; there were two shades of color, deep yellow and yellowish white.

No. 37. Cassiope tetragona, Don. In bloom July 1st; very common in the valley adjoining Lake Hazen, extensive beds having been seen at elevation from 400 to 500 feet; it also grew in considerable quantities about 100 feet above the sea on the south side of Bellot Island.

No. 38. Androsace septentrionalis, Linn. In bloom June 22d; from 50 to 500 feet above the sea, in clay or rocky soil, doing best in the former; specimens from 1½ to 3 inches high.

No. 39. Pedicularis capitata, Adams. In flower July 8th; from 100 to 700 feet altitude, on loamy soil, with dryas; generally but single stem and flower; occasionally specimens were seen with two flowers to single stem.

No. 40. Pedicularis Langsdorffii, var. lanata, Gray. In bloom June 22d; from 50 to 100 feet above the sea, in loamy soil; in company with dryas.

No. 41. Oxyria reniformis, Hook. In bloom June 5th; specimens over 7 inches high seen in the interior, and over 5 inches near the coast; grew best on clay soil.

No. 42. Polygonum viviparum, Linn. From 100 to 800 feet altitude; generally in beds or side of brooks, in rocky soil.

No. 43. Salix arctica, Pall. In bloom June 6th; from coast to 1,800 feet altitude; the largest specimens on the coast were about

1 foot long, and less than an inch in diameter at base of branches; in the interior of Grinnell Land specimens 1½ foot long, with extreme diameter of 1¼ inch, were found. It is interesting to note that dead willow was sufficiently plentiful in places to be used for fuel.

No. 44. Luzula hyperborea, R. Br.

No. 45. Juncus biglumis, Linn. Found only in the margins of small ponds from 100 to 800 feet elevation; largest specimen 5½ inches high.

No. 46. Eriophrum augustifolium, Linn. In bloom June 29th; from 800 to 1,200 feet altitude, generally in marshy soil, near mosses, lichens, and grasses; the specimens were from 3 to 8 inches high.

No. 47. Carex atrata, Linn.; or, ustulata, Wahl. From 600 to 1,200 feet altitude, in marshy or damp loamy soil; specimens from 1 to 6 inches high.

No. 48. Carex vulgaris, var. hyperporea, Book. In bloom July 25th, in a marshy spot near the sea; specimens from 1½ to 3½ inches high.

No. 49. Carex rupestris, All.

No. 50. Kobresia scirpina, Willd.

No. 51. Carex misandra, R. Br.

No. 52. Alopecurus alpinus, Linn. In bloom June 18th; grew generally on loamy soil; specimens near the coast 1 foot high; in the interior, on the shores of Lake Hazen, specimens from 12 to 18 inches high were of frequent occurrence.

No. 53. Arctagrostis latifolia, Gris. From the coast to 800 feet altitude; in loamy soil near the sea, and in marshy soil at greater elevation; specimens from 5 to 6 inches high.

No. 54. Deschampsia brevifolia, R. Br.; Aira arctica, Spr. Specimens from 2 to 4 inches high. Probably not the Aira arctica of Rothrock's "Flora of Alaska," nor the Aira cæspitosa, var. arctica, of Thurber in "Parry's Plants, etc."

No. 55. Trisetum subspicatum, var. molle, Gray. From the coast to 800 feet altitude, varying much according to location; the finest specimens about 7 inches high in rocky soil at greatest elevation.

No. 56. Poa cenisia, All.; Poa arctica, R. Br. Specimens 2 to 5 inches high.

No. 57. Poa alpina, var. vivipara.

No. 58. Poa laxa, Hænke. Specimens 3 to 8 inches high.

No. 59. Festuca rubra, Linn. Specimens 3 to 5 inches high.

No. 60. Agropyrum violaceum, Horum. Specimens 2 to 7 inches high.

No. 61. Cystopteris fragilis, Bernh. From near the coast to 1,300 feet altitude; specimens from 3 to 6 inches high, on rocky soil. This flower was found only on the rocky spur rising sharply from Dutch Island to the summit of Cairn Hill.

No. 62. Equisetum variegatum, Schl. From 50 to 100 feet altitude, on clay and loamy soil, doing better on latter; specimens infertile, from 1 to 6 inches high.

No. 63. Equisetum arvense, Linn. Similar in habitat to the preceding; specimens smaller (1 to 3 inches high), infertile.

No. 64. Diapensia lapponica, L. Only a single specimen of this plant was found, and Sergeant Jewell, the collector, was unable to give exact information as to its habitat.

APPENDIX X.

MOSSES AND LICHENS.

By the Rev. E. Lehnert and Lieutenant A. W. Greely.

The collection of mosses and lichens made by the Lady Franklin Bay Expedition was a large and important one, and its necessary abandonment is greatly to be regretted. Lieutenant Kislingbury employed his leisure time during two summers at Conger in making a collection of lichens, in which he embraced every possible species. He had no training for such work, but experience has shown that an intelligent man, with good powers of observation, can do creditable work in a comparatively unknown field. If any officer connected with the expedition had possessed sufficient botanical knowledge, the light and portable character of lichens and mosses would have enabled us to have brought back specimens of all important or doubtful species. The mosses and lichens pertaining to the Government collection were carefully packed and boxed ready for shipment, and were left in that condition. Those brought back belonged to my private collection, and comprised part of my personal baggage.

Unless otherwise set forth, the lichens and mosses were collected by me personally, and were carefully prepared for permanent preservation by Sergeant Joseph Elison.

The lichens and mosses from the highest point were, with one exception, brought back in the personal baggage of Sergeant Brainard, who collected them.

The identification of these specimens has been very kindly made by the Rev. E. Lehnert, of Washington, D. C., to whose courtesy and knowledge I am much indebted in this respect.

Unless otherwise stated, the collections are from the immediate

vicinity of Fort Conger, in latitude 81° 44′ N., longitude 64° 45′ W.

Identification and accompanying notes by Rev. E. Lehnert:

I. Bryaceæ.

No. 1. Campylopus flexuosus, Brid. Latitude, 80° 48′ 39″ N.; longitude, 78° 28′ W. Sergeant Brainard collector.

No. 2. Distichium capillacum, Bruch and Schimp. Grinnell Land. All the plants from Grinnell Land were collected by Lieutenant A. W. Greely himself. They had been well preserved, showed fine colors, and rather luxuriant growth. Unhappily only three species of them were fruiting, and conclusive determination was thus rendered difficult and in some cases impossible.

No. 3. Barbula alpina, Br Sch. Latitude, 83° 24′ N.; longitude, 40° 46′ W. Sergeant Brainard collector.

No. 4. Webera sphagnicola, Schimp. (?). Latitude, 83° 24′ N.; longitude, 40° 46′ W.

No. 5. Webera acuminata, Schimp. Grinnell Land.

No. 6. Webera cruda, Schimp. Grinnell Land.

No. 7. Webera longicolla, Hedw. Grinnell Land.

No. 8. Bryum purpurascens, Br. and Sch. Grinnell Land.

No. 9. Bryum brownii, Br. and Schp. Grinnell Land. (Also collected by Major H. W. Feilden, R.A., to the northward of the eighty-first parallel, generally in the vicinity of Floeberg Beach, 82° 27′ N., and by Mr. Hart in the neighborhood of Discovery Bay, Fort Conger.)

No. 10. Bryum pendulum, Br. and Sch. Grinnell Land.

No. 11. Bryum Duvallii, Voit. Grinnell Land.

No. 12. Bryum turbinatum, Schwaeg. Arctic form. Grinnell Land.

No. 13. Cinclidium Arcticum, Br. and Sch. Grinnell Land.

No 14. Cinclidium subrotundum, Selbg. Grinnell Land. Mixed with C. Arcticum, Br. and Sch.

No. 15. Cinclidium stygium, Swartz. Grinnell Land.

No. 16. Aulacomnium turgidum, Schwaeg. Grinnell Land.

No. 17. Aulacomnium (papillosum, Muell.(?)). Grinnell Land.

No. 18. Tetraplodon mnioides, L. Grinnell Land. (Also collected by Mr. Hart in the neighborhood of Discovery Bay, Fort Conger.)

No. 19. Philonotis fontana. Latitude, 83° 24′ N.; longitude, 40°

46′ W. Sergeant Brainard collector. Intermixed with Webera sphagnicola, Schimp. (Also collected by Major H. W. Feilden, R.A., to the northward of the eighty-first parallel, generally in the vicinity of Floeberg Beach, 82° 27′ N.)

No. 20. Atrichum (parallelum, Mitt. (?)). Grinnell Land. The incomplete state of the plant does not admit of certainty in identification, although exterior areolation of the leaves, etc., bring this plant closer to A. parallelum than any other one described. It might still be an undescribed variety of A. undulatum.

No. 21. Pogonatum alpinum, Roehl. Grinnell Land. (Also collected by Major H. W. Feilden, R.A., to the northward of the eighty-first parallel, generally in the vicinity of Floeberg Beach, 82° 27′ N.)

No. 22. Pogonatum capillare, Brid. Grinnell Land.

No. 23. Polytrichum formosum, Hedw. Grinnell Land.

No. 24. Orthothecium rufescens, Br. and Sch. Grinnell Land.

No. 25. Orthothecium chryseum, Br. and Sch. Grinnell Land. (Also found by Major H. W. Feilden, R.A., to the northward of the eighty-first parallel, generally in the vicinity of Floeberg Beach, 82° 27′ N., and by Mr. Hart in the neighborhood of Discovery Bay, Fort Conger.)

No. 26. Orthothecium rubellum, Mitt. (?). Latitude, 83° 24′ N. Sergeant Brainard collector. Only a fragment, covered with mucor and fungi, and therefore somewhat questionable, but agrees with the description so far as a comparison was possible. (Also found by Mr. Hart in the vicinity of Discovery Bay, Fort Conger.)

No. 27. Camptothecium nitens, Schreb. Grinnell Land. (Also collected by Major H. W. Feilden, R.A., to the northward of the eighty-first parallel, generally in the vicinity of Floeberg Beach, 82° 27′ N.)

No. 28. Brachythecium salebrosum, Hoff., var. Grinnell Land.

No. 29. Brachythecium plumosum, Swartz. Grinnell Land.

No. 30. Eurhynchium vaucheri, Lesq. Grinnell Land.

No. 31. Amblystegium minutissimum, Sull. (?). Grinnell Land. Might be A. sprucei, as it cannot be determined by the capsule, which is deficient, still its minuteness and other characteristics indicate the above species.

No. 32. Harpidium uncinatum, Hedw. Grinnell Land.

No. 33. Harpidium lycopodioides, Schwaeg. Grinnell Land.

No. 34. Harpidium vernicosum, Lindb. Grinnell Land.

No. 35. Caliergon sarmentosum, Wahl. Grinnell Land.

No. 36. Caliergon dilatatum, Wils. Grinnell Land.

No. 37. Caliergon turgescens, Schimp. Grinnell Land.

No. 38. Caliergon cordifolium, Hedw. Grinnell Land.

No. 39. Hypnum plicatile, Mitt. Grinnell Land.

To Dr. Lehnert's list and remarks I add, in order to complete this paper, the names of the following specimens found by the British Arctic Expedition of 1875–76 to the northward of 81° 40′ N. :

By Major H. W. Feilden, R. A. :

No. 40. Distichium inclinatum, S. W. Floeberg Beach. With young fruit. (Found also by Mr. Hart.)

No. 41. Pottia heimii, Hedw. Floeberg Beach. With ripe capsules.

No. 42. Tortula (Barbula) icmadophila, Schimper. Floeberg Beach. Barren.

No. 43. Tortula (Zygotrichia) leucostoma, Brown. Mushroom Point, 82° 29′ 12″ N. With perfect capsules. (Also found by Mr. Hart.)

No. 44. Tortula (Syntrichia) ruralis, Linn. Mushroom Point. A fragment adhering to a piece of Peltigera.

No. 45. Didymodon rubellus, Roth. Floeberg Beach. With Bryum brownii ; very small and barren.

No. 46. Encalypta rhabdocarpa, Schw. Floeberg Beach. With young fruit. Mushroom Point. Adhering to a fragment of Peltigera ; with capsules past maturity.

No. 47. Voitia hyperborea, Grev. et Arm. Floeberg Beach. With fruit in several stages.

No. 48. Splachnum wormskioldii, Hornem. Hayes Sound, Floeberg Beach, and Mushroom Point. All fertile.

No. 49. Tetraplodon urceolatus, B. and S. Mushroom Point and Port Foulke.

No. 50. Bryum calophyllum, Brown. Floeberg Beach and Payer Harbor. Barren. (Also found by Mr. Hart.)

No. 51. Timmia austriaca, Hedw. Floeberg Beach and Payer Harbor. Barren. (Also found by Mr. Hart.)

No. 52. Myurella apiculata, Hueb. Floeberg Beach. With *Pogonatum alpinum* ; and a fragment of Peltigera from Mushroom Point. All barren.

No. 53. Stereodon plicatilis, Mitt. Mushroom Point. Adhering to a fragment of Peltigera; barren. (Also found by Mr. Hart.) (Syn. No. 39.)

No. 54. Splachnum wormskioldii, Hornem. Floeberg Beach, Mushroom Point, and Hayes Sound. All fertile. (Found also by Mr. Hart.)

The following mosses were collected by Mr. Hart: Nos. 40, 43, 47, 49, 50, 51, 53, 54, and

No. 55. Orthotrichum speciosum, Nees. Winter-Quarters H. M. S. Discovery. Barren.

No. 56. Splachnum vasculosum, L. Musk-ox Bay. Fertile.

No. 57. Bryum arcticum, Brown. Musk-ox Bay.

No. 58. Bryum cernuum (?), Br. & Sch. Winter-Quarters H. M. S. Discovery. (Syn. No. 10.)

No. 59. Amblystegium uncinatum, Hedw. Winter-Quarters H. M. S. Discovery. (Syn. No. 32.)

No. 60. Amblystegium lycopodioides, Schw. Winter-Quarters H. M. S. Discovery. Barren and small. (Syn. No. 33.)

No. 61. Brachythecium cirrhosum, Schw. Winter-Quarters H. M. S. Discovery. In very small quantities; barren.

The following additional species were obtained in 1875 south of 81° 30′ N.:

By Major Feilden, R.A.:

No. 62. Dicranoweisea crispula, Hedw. Payer Harbor, 78° 42′ N. Not in fruit.

No. 63. Racomitrium lanuginosum, Dill. Payer Harbor. Barren. (Also by Mr. Hart in Hayes Sound, 78° 52′ N.)

By Mr. Hart:

No. 64. Leptobryum pyriforme, Linn. Hayes Sound. With fruit.

No. 65. Amblystegium (Acroceratium) trifarium, Wet. and M. Hayes Sound. Barren.

No. 66. Amblystegium (Acroceratium) sarmentosum, Wahl. Hayes Sound. Barren. (Syn. No. 35.)

Also a Jungermannia, Blepharozia trichophylla, Linn. Hayes Sound.

The following Jungermannia and lichens were also brought back by me, and identified by Dr. Lehnert. They are from Fort Conger or vicinity, 81° 44′ N.:

II. Hepaticæ.

No. 1. Jungermannia ventricosa, Dicks. Grinnell Land.

III. Lichens.

No. 1. Cetraria cucullata, Ach. Grinnell Land.

No. 2. Cetraria chrysantha, Tuck. Grinnell Land. Intermixed with fragments of C. cucullata.

No. 3. Peltigera aphthosa, Hoff. Grinnell Land.

No. 4. Placodium elegans, D.C. Cape Baird, latitude 81° 32′ N.

No. 5. Placodium crenulatum, Wallr. Cape Baird, latitude 81° 32′ N.

No. 6. Cladonia rangiferina, Hoff. Grinnell Land and Cape Baird.

No. 7. Omphalaria (?). A very scanty specimen was brought along, growing upon a rock from the most northern point reached. Its fragmental character did not allow any determination. So far as the microscopical researches could be carried, the plant showed relation to the questionable *O. silesiaca*, Kbr., 83° 24′ N., 40° 45′ W. Lieutenant Lockwood collector.

It thus follows that sixty-one species of mosses have been found north of 81° 30′ N., of which seven species were found only by Major Feilden, seven by Mr. Hart, thirty-two by the Lady Franklin Bay Expedition (Sergeant Brainard or myself), and fifteen by two or more of us.

Of the seven lichens brought back by chance, two possess especial interest. The species of Omphalaria (silesiaca, Kbr.) was found adhering to a piece of quartz brought by Lieutenant Lockwood from the highest land ever attained, 83° 24′ N., 40° 45′ W. The specimens of Cladonia rangiferina, Hoff., were found by me as a scanty growth at Cape Baird and in the vicinity of Fort Conger, at an elevation of about eighteen hundred feet above the sea. In the valleys on the south side of Lake Hazen, in the interior of Grinnell Land, occasional patches of this lichen were found by me, though always of stunted growth. The discovery of this lichen in Grinnell Land is of particular interest in connection with the remarks of Sir Joseph D. Hooker, President of the Royal Society, who, in commenting on the paucity of well-developed lichen specimens from Grinnell Land, says (Nares' "Voyage to the Polar

Sea," vol. ii., p. 309): "This is the more remarkable, as it might naturally be expected that such lichens would during the long winter season constitute the principal or only food of the musk-ox that exists in those regions. It is strange that the reindeer-moss (Cladonia rangiferina, Hoff.), so common in other Arctic regions, appears to be absent from Grinnell Land." He further says: "Many circumstances combine to show that if there be land at the North Pole, lichens will be found there." While the results of my own observations and experiences render it quite certain that the musk-oxen of Grinnell Land do not subsist upon the lichens, but on grass, saxifrage, dryas, and willow, yet our experiences bear out fully the scientific deductions of that great botanist as to the theoretical fauna of Grinnell Land and the country to the northward. This moss, which he expected, was discovered, and the observations of Lieutenant Lockwood on the highest attained land, in 83° 24′ N., prove the existence of considerable vegetation and numerous lichens at that latitude, and inferentially as far northward as Greenland extends.*

* Since the preparation of this report two new species have been identified by the Rev. E. Lehnert, from a private collection of Sergeant Jewell, viz.:

Caliergon Richardsoni, Mitten. Grinnell Land.

Orthotrichum (Douglasii, Dubey (?)).

This moss (at least comes the closest to *O. Doug.*, but different from all others in my possession) might be a new species.

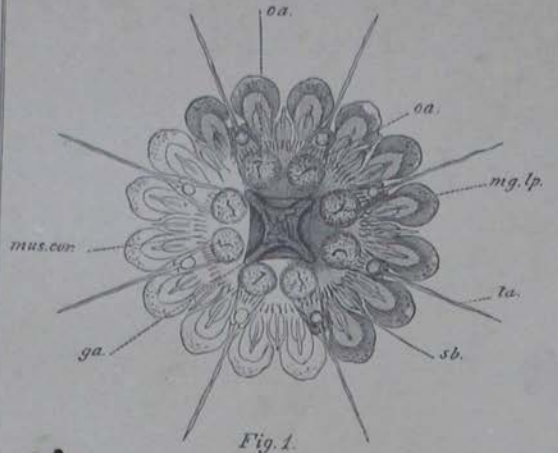


Fig. 1.

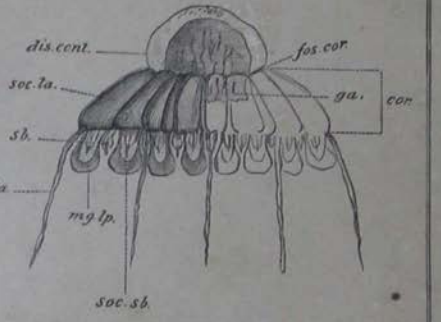


Fig. 2.

NAUPHANTA POLARIS. (FEWKES.)

APPENDIX XI.

REPORT ON THE MEDUSÆ COLLECTED BY THE LADY FRANKLIN BAY EXPEDITION, LIEUT. A. W. GREELY COMMANDING.

By J. Walter Fewkes.

The following paper is based on notes and sketches sent me for study by Lieutenant Greely. No specimens were examined. In a letter accompanying the drawings Lieutenant Greely writes that these medusæ were collected mostly by himself in Discovery Harbor, latitude 81° 44′ N., longitude 64° 45′ W. :

No. 1. ACRASPEDA.

Nauphanta, Hæckel.

(Plate 1, Figs. 1 and 2.)

Two good drawings of a medusa with characters of the genus *Nauphanta* were made by Sergeant Gardiner. The jelly-fish from which they were drawn probably belongs to a new species, for which the name *Nauphanta polaris* is suggested.

The genus *Nauphanta* was collected by the Challenger in the Southern Atlantic, in March, 1876, at a great depth below the surface. It was first described by Hæckel ("Report on the Deep Sea Medusæ Dredged by H. M. S. Challenger during the years 1873–76," Part I., by Ernst Hæckel; "Report on the Scientific Results of the Voyage of H. M. S. Challenger during the years 1873–76, Zoology," vol. iv., No. 11, p. 102), and has not been recorded since its discovery up to the present. Hæckel's account is based on two specimens, both of which he ascribes to the deep sea, and places in a single species, *challengeri*. It is a remarkable fact in the geographical distribution of this genus that a second species, or that

described in this report, not only lives in northern latitudes, but at or very near the surface of the ocean. From the notes I learn that the medusa was captured from April 25th to June 1, 1883.

The genus *Nauphanta* is a characteristic one, and is remarkable in the peculiar sculpturing of the exumbrella, the division of the umbrella on the exumbral side into a central and coronal or peripheral zone, and the possession of eight tentacles alternating with the same number of sense-bodies.

Nauphanta Polaris, Sp. Nov.

(Plate 1, Figs. 1 and 2.)

The umbrella, when observed laterally in profile, is seen to be irregularly conical, hat-shaped, with inflated crown. The diameter of the largest is one and nine-tenths inches; that of the smallest a quarter of an inch. Color, "maroon, semi-transparent, the central part of the specimens appearing almost black."

The umbrella is superficially divided into two zones, as can be seen either from the exumbrella or laterally. The central zone (Fig. 2, *dis. cent.*) is called the zona centralis; the marginal, the zona coronalis or corona. The central zone forms the crown of the hat-shaped umbrella, or its apical region, and is separated from the corona by a ditch called the fossa coronalis (Fig. 2, *fos. cor.*). The zona centralis is nearly spherical, slightly constricted near the apex, and has an opaque interior. The corona (*cor.*) forms that part of the umbrella which is placed abaxially to the coronal fossa, by which it is separated from the central zone. Its surface is inclined at an angle of forty-five degrees to the axis of the medusa. It has an annular contour. It bears on its peripheral border the tentacles (*ta.*), sense-bodies (*sb.*), and marginal lappets (*mg. lp.*), known also as patagia.

When seen either from the exumbrella or in profile laterally (Fig. 2) the corona is seen to be crossed by sixteen radial incisions, which separate the same number of radial elevations extending from the fossa (*fos. cor.*) to the external margin of the umbrella.

These ridges or elevations (*soc. ta.* and *soc. sb.*) are known as socles, and support alternately the tentacles and sense-bodies. On the peripheral margin the socles are broader than in the vicinity of the coronal fossa, and are therefore slightly wedge-shaped. In the

sketches no difference was observed in the size (breadth) of the tentacular socles (*soc. ta.*) and the socles of the sense-bodies (*soc. sb.*). The specimens from which they were drawn must have shown a marked difference in dimensions.

Each tentacular socle (*soc. ta.*) bears on the peripheral border a tentacle which alternates with a sense-body. There are therefore eight tentacles and eight sense-bodies, with the same number respectively of tentacular socles and socles of the sense-bodies.

The sense-bodies (*sb.*) in *N. challengeri*, Hæck., are rudimentary; in the figures of *N. polaris* peduncles only of these bodies are represented. The marginal lappets (*mg. lp.*) hang almost vertically from the peripheral or abaxial end of the socles. They are sixteen in number, and alternate with the tentacles and sense-bodies, bridging the incisions which separate the tentacular socle from that of the sense-body. Each marginal lappet is circular, composed of an outer, distal, thin region skirting an axial or basal thickened portion, which serves as its support and unites it to the margin of the umbrella. The basal region is penetrated by a simple, unbranched tube, blindly ending on the distal end, and probably opening into a ring-shaped sinus, or sinus coronalis, at the proximal or axial extremity. The region of the lappet which forms its outer end, or rim, is dotted in the sketch as if with a pigment of deeper color than the umbrella.

The tentacles (*ta.*) arise from a somewhat thickened base, into which runs a tube similar to that mentioned in the case of the marginal lappets. The tentacles are eight in number, flexible, "eight-tenths of an inch in length." The peduncles of the eight sense-bodies (*sb.*) are slender, penetrated by an unbranched tube. No sense-capsule represented in the sketches.

Fig. 1 probably represents the medusa from the subumbral side, the quadrate central body (*ga.*) representing the stomach, and the ring of eight swollen, spherical glands about it the ovaries (*oa.*), or spermaries.

The stomach, when seen from the subumbral side, is quadrangular, the angles of the square lying in the same radii as alternate sense-bodies. The union of the stomach with the wall of the subumbrella is in the form of a cross with equal arms. The lips are simple, without appendages. Filamentous bodies in the interior of the stomach, enclosed by the four walls of the quadrant, as shown in

Fig. 2, are probably gastral filaments. The diameter of the stomach is .65 of an inch.

No visible representation of a division of the subumbrella into central disk and corona was observed.

The eight sexual glands forming a zone immediately surrounding the stomach are regularly arranged, the intervals being about equal between them. Abaxially to this zone, in the position occupied by the great subumbral coronal muscles of *Atolla* and *Collaspis*, we find a zone of parallel radial markings (*mus. cor.*), which are identified as dividing lines which separate the bellies of the smaller muscles which together form the large muscle.

Still more peripherally placed than the last zone, we can see the abaxial extremities of the tentacular socles through the transparent walls of the subumbrella, and outside of this zone is the zone formed by the under sides of marginal lappets (*mg. lp.*).

There can be little doubt that this medusa, if not the same as *N. challengeri*, is closely allied to it. *Nauphanta* as a genus is so characteristic in the radial sculpturing of the corona, and one sketch of the polar jelly-fish shows the structure in such a marked way, that I have not hesitated to call the medusa from which the drawings were made a true *Nauphanta*.

In the notes accompanying the sketches the medusa is doubtfully referred to *Ptychogastria polaris*, described by Allman ("Narrative of a Voyage to the Polar Sea during 1875–76, in H. M. Ships Alert and Discovery," vol. ii., p. 292). This suggestion I cannot entertain, for, if the description by Allman can be relied upon, we find in *P. polaris* none of the characteristic coronal socles of the above description, and a much larger number of tentacles in a smaller specimen. The marginal lappets of the two are very different in size, number, and relative prominence. I cannot, therefore, accept the suggestion of the notes.

Confessedly, however closely the generic details of the structure agree in *Nauphanta challengeri* and *N. polaris*, the profiles of the two medusæ, as seen in the lateral views by Hæckel for the former and by Sergeant Gardiner for the latter, are very different. Let me call to mind, however, that Hæckel's sketch is from an alcoholic specimen, while that of Gardiner is from a live medusa. I believe, therefore, that the latter's profile view, Plate 1, Fig. 2, is more accurate than Hæckel's for general outline, and it certainly approaches

more closely what we have every reason to suspect would be the true form of the umbrella from the relationship of the genus to *Periphylla*, where the central zone is more prominent.

The difference in profile between Hæckel's *Nauphanta* and the polar specimen is the main ground of my separating the latter as a new species.

No. 2. NARCOMEDUSÆ.

Solmundella, Sp. (?).

A specimen, the sketches of which by Sergeant Gardiner have characters of both *Solmundella* and *Æginella*, was captured in Discovery Harbor. As the most important, perhaps only, difference between the two genera lies in the absence of peronial canals and circular tube in *Solmundella*, and their presence in *Æginella*, and as these structures may have been overlooked if they exist, I cannot definitely determine the genus from the material at hand.

The bell is shaped like that of *Solmundella*, and has two long tentacles and eight gastral pouches. The belt is destitute of tubes. These are all characters of *Solmundella*.

I cannot tell whether the species is the same as that of known *Solmundellæ* or not, on account of the incompleteness of my knowledge of the Arctic medusa.

No. 3.

Solmundus, Sp. (?).

What has just been written of the tubes in the bell of *Solmundella*, as compared with *Æginella*, may also be repeated of a specimen of *Solmundinæ*, with four tentacles, which, accordingly as it has or has not peroneal canals and circular vessel, may be placed in the genus *Ægina* or *Solmundus*. From knowledge of a medusa from Point Barrow, Alaska, I am inclined to believe that *Ægina* lives in the Arctic, and that the somewhat inconspicuous canals were overlooked in the specimen collected by the Lady Franklin Bay Expedition.

Tubes are not represented in the sketches (Lockwood, del.), and I have therefore referred the medusa to *Solmundus*. According to

the notes, the medusa was found with "a small shrimp in its stomach," which can easily be seen through the walls of the umbrella.

The specimen "has four tentacles, which, unlike others, spring from the outer surface (of the bell), and have their roots about half way between the summit and base."

No. 4. HYDROIDA.

Tiara Conifera, Hæckel.

Two good sketches of a medusa referred to this species were made by Sergeant Gardiner. They agree with Hæckel's description in the most particulars. Hæckel says, however, that the type has from twenty-four to thirty-two tentacles. Sergeant Gardiner's sketches represent at least forty-eight of these structures.

T. conifera is probably a variety of the highly variable *T. pileata*, L. Ag.

The notes mention that with the medusa, which is here referred to *T. conifera*, there was a specimen "like it, with four large and numerous small tentacles, but without projections at the top." I offer the suggestion that this is the young of *T. conifera*, and likewise of the *Oceania turrita*, Forbes, both of which, with *O. octona*, Forbes, are probably one species and young of *T. pileata*.

Although the *O. turrita* has four tentacles, it has a large calapi prominence, and must be regarded as older than Greely's *Tiara* with four large tentacles. In the genera *Stomatoca* and *Dinematella*, where a similar apical conical projection is found in the adult, we know that it is absent in the young, and the same condition is probably true in *Tiara conifera*.

The type specimen of *T. conifera* was collected in Greenland.

No. 5. SIPHONOPHORA (?).

Agalmopsis.

Among the notes is the following, which may refer to the Ascidian *Salpa*, or to some genus of Physophores, more probably to the latter. This is probably the same as the *Agalmopsis* (*Nanomia*) *cara* (A. Ag.), Fewkes, recorded from Robeson Channel by Dr. E. L. Moss ("On the Surface Fauna of the Arctic Seas," *Journ. Linn. Soc.*, vol. xiv., p. 122).

"April 24, 1884.—I also caught a rope-like collection of organisms which was over a foot long. They were of blood color, part light or ruby, and part like clotted blood. They moved through the water with a sinuous motion like that of a sluggish snake. They fell apart in the net and separated very readily. Possibly they are eggs of young medusæ, say of No. 2. There was some gelatinous substance intermixed with them."

No. 2, Gardiner, del., printed No. 8, is a *Mertensia*, and although we know that some *Ctenophora* are said to lay eggs in strings or masses, I know of none with eggs of "blood-color" as descriptions indicate. In *Pleurobrachia*, a genus allied to *Mertensia*, the ova are separate and not arranged in strings, although found in masses of slime. They are, however, colorless.

I am of the opinion that these notes refer to compound adult organisms. It is possible that the "collection of organisms" is a chain form of some species of *Salpa*, but from the color and other characters I am inclined to regard it a *Physophore*. The sinuous motion is a common movement of the chain form of the Ascidian, *Salpa*.

No. 6. CTENOPHORA.

Lesueuria, Sp. (?).

The following notes are thought to refer to the genus *Lesueuria*:

"April 24, 1883.—I caught to-day a very large medusa, five inches long by two and a half inches wide. It was of the most delicate character, and fell to pieces while the doctor was getting it into alcohol. I had it drawn by Lieutenant Lockwood. It had two spots of smoke-color at the upper end, which was pointed like a melon. Indeed, the shape was that of a melon, except that the lower end was, as you may say, cut off. There were eight ribs (combs), which were of smoke-color, and which, as far as the lower end went, were simply a succession of annular formations that presented a serrated appearance on either side. There appeared to be two large stomachs. The animal was transparent everywhere, except the ribs and spots and the thread-like outline of the stomachs. Occasionally from the tentacles iridescent colors, with purple shades predominating, were seen."

The last sentence in the above notes would indicate that the *Ctenophore* here described does not belong to *Beroë*, which genus the sketch closely resembles. Neither notes or sketches are exact enough to determine whether the "tentacles" are true tentacles or auricles. I suspect from the "iridescent colors" that auricles and not tentacles were observed by the writer of the notes. If auricles or tentacles are present, the *Ctenophore* is not a *Beroë*.

No. 7.

Bolina, Sp.

A sketch which, as far as it goes, points to the genus *Bolina* is supposed to belong to this genus known to frequent Arctic waters.

The following notes confirm this belief:

"Saddle-bags" (a good characterization of the form of *Bolina* when seen in certain conditions).

"Found May 21, 1883.—The fuzzy edges (combs), iridescent and eight in number, extend only half the length of the animal, where they give place to an extension in the form of a thin dark-brown line (chymiferous tubes) running to the lower extremity. Specimen three inches" (length).

It is probable that this *Bolina* is the same as that observed in 1671 near Spitzbergen by Martens, a pioneer in the study of the *Ctenophora*.

No. 8.

Mertensia Ovum (?), Mörch.

A good drawing (Gardiner, del.) of a tentaculated *Ctenophore*, allied to *M. ovum*, is found in the collection, with the following notes:

"Length (antero-posterior axis) ..... 1.1 inch.
Width (lateral axis) ..... .7 inch.
Thickness (shorter lateral axis) ..... .5 inch.

"Color white, semi-transparent. The fringes (combs) iridescent. Trailing cirrhi (tentacles) a delicate pink. The ball in the centre orange tipped with red."

REMARKS ON UNKNOWN MEDUSÆ.

Sketches Nos. 9 and 10.

I find myself unable to make out enough of the structure in sketches 1a, 1b, 1c, 2, 3, and 6 (Lockwood, del.) to determine the genus of medusæ from which they were drawn with any accuracy. Figs. 1a, 1c, and 6 are undoubtedly from a Tubularian hydroid, and 3 is probably either the Ephyra or adult of a *Discophore*. In regard to 2 I have no opinion to express.

Notes.

I find myself unable to identify the medusæ mentioned in the following notes:

No. 11.

"Another, no drawing, something like No. 4, Gardiner, del., [The medusæ drawn by Sergeant Gardiner, No. 4, printed No. 7, is probably *Bolina*, which has only two true tentacles and four auricles, which are possibly the bodies mentioned as tentacles. The four auricles with the two tentacles together would make six tentacles mentioned in the notes.] except (there are) two solid lines and four large tentacles instead of three lines and six tentacles, is nearly crown-shaped, and has two lines which, running from edge to edge, cross each other through the summit. There is a small yellow spot filling in between the lines and the summit. There are four tentacles, the extensions of the dividing lines, and numerous small ones."

If the "two lines which, running from edge to edge, cross each other through the summit" are, as I suspect, rows of "combs," and if there are only four of these rows (viz., two pairs) on the surface of the body, this is a new genus.

No. 12.

I have no opinion to express in regard to the generic name of the medusæ found during the winter in water drawn from "tide-hole." They are, according to the notes, found in large numbers and are phosphorescent. "I doubt," writes Lieutenant Greely, "if they were more than one-twentieth of an inch in diameter, and the only color visible was a faint brownish spot."

LIST OF MEDUSÆ COLLECTED.

The first set of numbers, referred to above as "printed numbers," are those under which the medusæ are mentioned above; the second set are the original numbers of the drawings and notes.

No. 1. *Nauphanta polaris*, sp. nov. ..... No. 1. Gardiner, del.
No. 2. *Solmundella*, sp. ..... No. 3. Gardiner, del.
No. 3. *Solmundus*, sp. ..... No. 5. Lockwood, del.
No. 4. *Tiara conifera*, Hæckel ..... No. 5. Gardiner, del.
No. 5. *Siphonophore?* ..... No. 5. Greely's notes.
No. 6. *Lesueuria*, sp. ..... No. 4. Lockwood, del.
No. 7. *Bolina*, sp. ..... No. 4. Gardiner, del.
No. 8. *Mertensia ovum*, Mörch ..... No. 2. Gardiner, del.
No. 9–12. Unknown medusæ .. Nos. { 1a, 1c, 2, 3, 6. Lockwood, del. / 11, 12. Greely's notes.

EXPLANATION OF THE PLATE.

Fig. 1. *Nauphanta polaris*, from the subumbral side: ga., Stomach; mg. lp., Marginal lappet; mus. cor., Coronal muscle; oa., Ovary; sb., Sense-body; ta., Tentacle.

Fig. 2. *Nauphanta polaris*, lateral view: cor., Corona, zona coronalis; dis. cent., Discus centralis, zona centralis; fos. cor., Coronal ditch, fossa coronalis; ga., Stomach; mg. lp., Marginal lappet; sb., Sense-body; soc. sb., Socle of the sense-body; soc. ta., Socle of the tentacle; ta., Tentacle.

APPENDIX XII.

ON SALMON CAUGHT IN LAKE ALEXANDRA, 81° 40′ N.

By Dr. T. H. Bean,

Curator United States National Museum.

In attempting to name this species of trout (from a photograph sent me), I desire to call attention to the fact that it is almost impossible to determine the charrs, and indeed any species of the *Salmonidæ*, from photographs alone. Certain essential characters cannot be brought out by a photograph, and without information concerning them one cannot reach a satisfactory conclusion. I have, however, compared the photograph with the descriptions and figures of all of the species recorded from Arctic regions, and I have arrived at the belief that your trout is the *Salvelinus stagnalis* (Fabr.), Gill and Jordan, a species which has been taken in lakes and on the sea-coast of Greenland and Boothia Felix. This charr reaches a large size, and bears considerable resemblance to the common brook trout of the Eastern United States, Canada, and Labrador, *Salvelinus fontinalis*. The latter species, however, has no hyoid teeth, while in *S. stagnalis* the hyoids are well developed.

I suspect that the *Salmo arcturus* of Günther, recorded in the "Proceedings of the Zoological Society of London," 1877, p. 294, as "the northernmost *salmonoid* known at present," is very closely related to your species. This trout was taken at Victoria Lake and Floeberg Beach by Captain Feilden. It was found to be mature when twelve inches long, therefore it is, apparently, a smaller species than yours. There is much confusion and very little definite information about the *salmonoids* of the high northern regions, mainly because of the lack of specimens from those regions and the insufficient descriptions published by the naturalists who studied Arctic specimens.

In examining the photograph, I can see very plainly traces of the milky-white margins which ornament the ventrals and anal during the breeding season.

APPENDIX XIII.

ACCOUNT OF AURORAL DISPLAYS ACCOMPANYING THE GREAT MAGNETIC STORM OF NOVEMBER 15–19, 1883, NOTED AT FORT CONGER, GRINNELL LAND.

(From Journal of Lieutenant A. W. Greely.)

"November 14, 1883.—An aurora for a short time this morning, from 9.30 to 10.05 A.M. It showed to one observer vivid blue and red colors, and to a second a bright yellow shade. At one time a patch of blue, red, and yellow, like a mock sun, appeared for a few seconds. Occasionally I saw light blue and saffron-yellow tints. I mention these colors, as usually the aurora here is of a mild yellowish-white. That of last evening (November 13th) was colorless. The magnet has been very unsteady since yesterday, showing the most marked disturbance last night nine minutes after the display ceased. It seems to be the experience here that the magnet is undisturbed during the prevalence of colorless auroras, but shows marked disturbance during the vivid displays of color and sudden, violent changes of form."

"November 15th.—Sergeant Israel called me at 5 A.M. to observe an aurora which had been very brilliant. It was at first of the curtain formation, and covered the entire horizon. The curtains were later accompanied by many streamers which ran to the zenith. It continued with brilliant but varying splendor until after 8 A.M. It would be utterly impossible for any one to describe its graceful and beautiful outlines, or enumerate their peculiarities, so intricate were the form and rapid the changes. The curtain, in folds, shifting from point to point, at times suddenly faded, showing but a pencil-line of light, which resembled threads of liquid fire. The streamers repeatedly changed from the most intricate garlands to the most elaborate convoluted network; then came gleaming lances, perhaps to suddenly change into lace formations, and then return as shining spears, which would suddenly spring up and

form into arches. The light, as observed by me for an hour or or more, was colorless. The temperature is down to −30° (−34.4° C.) again."

"November 16th.—An auroral display which remained continuous during the greater part of the day. It first appeared in dim patches, in the northwest about 15° above the horizon, which gradually brightened and took the shape of a regular cone, which lasted for five minutes or more, while from its well-defined summit ascended luminous auroral clouds with a whorling or curling motion. These clouds emanated apparently from the summit of the cone, in the form of sharply-defined, spasmodic puffs, such as are seen at times issuing from the smoke-stack of a locomotive. The clouds thus thrown out immediately diffused and disappeared without assuming any marked formation."

"November 17th.—Sergeant Gardiner called me at 5 A.M. to observe a very brilliant and remarkable aurora. He said that its greatest beauty had vanished before I saw it. As seen by me, however, it was a most extraordinary display of the curtain formation, which covered the entire heavens and was constantly changing, never quiescent even a second. The very magnificence of the display forbids any attempt at description. A very marked magnetic disturbance appeared at the same time, and I ordered five-minute readings to be taken until further orders. Lieutenant Lockwood assisted in the work to-day. The five-minute readings were continued throughout the day. The range of the needle register was considerably over 19°. At 8.35 A.M., Göttingen mean time, the magnetic variation was but 92° 51′ 6″ W., being the lowest reading which has yet been made. The aurora was visible over nine hours to-day."

"November 18th.—The magnetic disturbance still continues. Five-minute readings were made until 9 P.M. (W. M. T.), when the disturbance apparently ceased, and they were discontinued. At 10.20 P.M. (G. M. T.) on November 17th the largest recorded magnetic variation was noted. The needle then stood at 113° 19′ 8″ W., a change of 20° 28′ 2″ since 8.35 A.M. of November 16th. The aurora was observed frequently during the day."

"November 19th.—Magnetic disturbance again occurred, and five-minute readings were kept up from 5 P.M. Aurora appeared shortly after the disturbance of the magnet commenced."

"November 20th.—Five-minute readings continued the greater part of the day, owing to the recurring magnetic disturbance."

Extract from the journal of C. B. Henry, of November 16, 1882:

. . . . . .

"I happened yesterday, while at work out-doors, to look toward Bellot Island, and saw a small, dim auroral light appear from azimuth about N. 260° E., which gradually became brighter and shot up to an altitude of about 20°. The best idea I could give of its formation or movement is about like the smoke ascending and curling up from the crater of a volcano, being discharged in puffs and floating away in a luminous mass." . . . . .

Extract from the journal of D. C. Ralston, November 16, 1882:

. . . . . .

"A magnetic storm evidently raging, as the needle is on the jump all the time; five-minute readings are being kept up, and the sky is almost constantly filled with aurora." . . .

Extract from the journal of D. L. Brainard, November 16, 1882:

. . . . . .

"The sky was filled with auroras during the greater part of the day. The observers also speak of several displays which occurred last night, some of which were of remarkable beauty and intensity of coloring. A well-marked magnetic disturbance was also experienced.

"The only display witnessed by me was this morning between ten and eleven o'clock. A bright streamer sprang from the southern horizon, gradually approaching the zenith with a labored movement, closely resembling the spasmodic puffs of smoke rising from a working locomotive. Remaining in this position a short time, it was gradually dissipated and slowly disappeared.

"It had scarcely faded from view before another streamer darted with great rapidity from the northern sky, and passing through the zenith reached the southern horizon, where it remained for several minutes glowing with an intense brilliancy which perceptibly enhanced the feeble light furnished us by the rapidly departing sun. That portion of the streamer 10° above the northern horizon had assumed a most peculiar formation, that of a spherical coil, and was twisted into the most inconceivable shapes. It disappeared about half an hour after the first had made its appearance." . . . . . .

Extract from the journal of C. B. Henry, of November 17, 1882:

. . . . . .

"The aurora of this morning was a very low one, and we are, I think, the only party that ever could say that we were in the midst of electric light. In fact its alarming close proximity scared one of our members considerably. At 11 A.M. I noticed a bright streamer from N. 10° E. and spirally ascending to the zenith, and the northeastern horizon was bathed in a pale red color.

"The aurora which occurred this morning was undoubtedly an exhibition that never will be forgotten by the members of the expedition. From 1 A.M. until 9.40 P.M. the glorious spectacle was almost constantly before our bewildered eyes. The most remarkable and brilliant display occurred between 5 and 6 A.M., and I will alone confine myself to the events of that short hour as the others would be only adscititious. When the observer stepped out-doors at 5 A.M. nothing but a few blotches and patches of irregular and colorless light was visible, but upon completing his magnetical observation, fifteen minutes past the hour, and upon suddenly coming from the dark observatory, the dazzling light that suddenly met his eyes beggared description and produced momentary blindness. The whole heavens were covered with one vast mass of brilliant light of intense brightness.

"His rapid entrance into our quarters, and calling out for others to witness the spectacle, caused *all* to arise and rush out-doors.

"The display had sufficient attraction for the most of us to hold us spellbound for more than twenty minutes in a temperature of 66° below the freezing-point. The aurora defies description; it is indescribable by words, and not to be pictured by painters' skill. Nothing can convey a conception of the richness and vividness of its colors and infinite variety of tints.

"Arches with every shade of red, from the palest pink to crimson, and every shade of yellow, from brilliant orange to delicate primrose, now dazzling and resplendent, now gently glowing in humbler effusion, and suddenly shooting thousands of narrow radiant streaks and bars of light in a semi-circle toward the zenith. Streamers of every shade of green, from the softest apple or pea to the dark invisible green of the hemlock pines, harmoniously blend the lovely tints of lilac and purple with the celestial blue of the canopy, and shining here for an instant and then playfully skipping to another portion of the sky.

"In the north we saw annular circles, with multitudinous streaks and spots of every gradation of hue and of but momentary transitions, which defy description; while in the northeast eight concentric curves of 15° to 20° radius, with their ends turned backward, assumed the form much like the letter "s." The inner curves quickly disappearing and reappearing, or being replaced by others formed on the outside, presented to the eye the ever-shifting variations of the kaleidoscope. The whole display now and then united in a luminous half-transparent curtain rolling quiveringly from horizon to zenith, curling and expanding, rising and falling like the waves of an angry ocean, and suddenly steadying down again to the predominating characteristic formation of the loose flowing folds of a curtain, and veiling for the time the stars.

"The light emitted during the most intense brightness was fully equal to that of a full moon, and entirely eclipsed all but stars of the first magnitude. Objects in the landscape were plainly visible and abundant. The height which the display maintained above the earth was at no time at a greater elevation than that of cumulus clouds, and apparently almost touched the ground, but no noise of any kind was audible." . . . . .

Extract from the journal of G. W. Rice, November 17, 1882:

. . . . . .

"To-day, however, was witnessed the most remarkable display of the aurora phenomenon that has yet been observed by any of the party. Gardiner was on duty as observer, and at 5.15 A.M. rushed in and awakened all hands to see a grand sight. The magnificent spectacle is now the only topic for conversation, and, although I can get full accounts of it, I cannot say that I saw it myself. The journals, both official and private, have pages covered with descriptions more or less glowing. I can only note that from all accounts it must have been a grand spectacle. The whole heavens appear to have been occupied by it. The general formation was curtain, hanging in heavy folds, but at times it assumed all shapes, rapidly changing into beams, arches, etc. The colors were remarkably brilliant and vivid. At the base red, pink, and violet, rapidly changing and interchanging. In the centre the colors were lighter, pale yellow, or straw color, and white. The light or illumination was quite equal to that of the full moon. The surrounding land-

scape could be plainly made out, and stars of the second magnitude were eclipsed. Coming out of the dark quarters, all who observed it felt at first blinded; and the curtain at one time appeared so near above their heads that Gardiner and Israel speak of having unconsciously dodged to avoid it. Israel, who is a very close and intelligent observer, thinks that at times the aurora could not have been more than one hundred feet from the earth.

"During the display the magnetometer was violently disturbed, and so indeed it was during the whole day.

"The display, in its greatest magnificence, soon passed away, but less remarkable displays were seen all day, and some of them which I myself saw were very beautiful." . . . . .

Extract from the journal of W. S. Jewell, November 17, 1882:

. . . . . .

"Still auroras. This morning the finest display, with but one exception, I ever saw, and that was when returning home in the Gulnare, in 1880. Gardiner, who was on duty at the time, called us up, and it was well worth the trouble. Israel went to the magnetic observatory and found the magnet very much disturbed in consequence. We began five-minute readings which continued through the day, Henry and Connell doing the meteorological work." . . . . . .

Extract from the journal of D. C. Ralston, November 17, 1882:

. . . . . .

"A magnificent auroral display early this morning. Everybody up to witness it. The entire heavens covered with all kinds of formations, and movements in the change of formations so rapid that the eye could not follow them. It appeared so low down at times that I raised my hand instinctively, expecting to *bathe* it in the light. The sky was entirely free from clouds, and the light of second-magnitude stars was eclipsed. The magnetic needle was violently agitated, and five-minute readings of the needle continues. The aurora visible all day long. Objects during the finest display were as plainly visible as by the light of the full moon.

"The finest display was about 5 A.M. Lieutenant Lockwood assisted us at the magnetic observatory.

"No description that I can do would give an idea of its grandeur." . . . . . .

Extract from the journal of H. S. Gardiner, November 17, 1882:

. . . . . .

"Have been having an extraordinary disturbance of the magnetic needle for some hours past. This morning about 5 A.M., when coming out of the magnetic observatory after making my observation, I was suddenly dazzled by the display of light which greeted my eyes as I emerged from the darkness. The transition was so great and so sudden that I think it must have been half a minute at least before I recovered myself sufficiently to think what had happened. The whole heavens seemed one mass of colored flames, arranged and disarranged and rearranged every instant. The display was so close to the earth that we repeatedly put up our hands as though we would touch something by so doing. There was one person who was so much affected by the display at its grandest moments that he lowered his head and put up his hands as though to ward off a blow. All hands came from their beds to witness the display, and auroras have been our most common phenomena since darkness set in. Magnetic observations (extra) were immediately commenced, and continue at intervals of five minutes until the display shall end.

"This display sustained its greatest grandeur for probably ten minutes, and then gradually grew less brilliant. It continued all day with occasional vivid flashes. I doubt not that this is the greatest exhibition of the aurora which has ever been witnessed. I have read descriptions of other great auroras, but they would but partly suffice for the display I have just recorded, and which I think it would be impossible to describe adequately."

Extract from the journal of D. L. Brainard, November 17, 1882:

. . . . . .

"Great excitement prevailed during the whole day and a portion of last night, owing to the beautiful displays of aurora which we have observed. Being aroused by an unusual commotion at 5.15 A.M., in consequence of an auroral display of unusual appearance, I, in company with several others, rushed outside. For a moment we were startled by the unparalleled magnificence of the scene spread out before us. The heavens appeared to be one luminous mass of blazing light, which at times exhibited colors of pale blue, yellow, and white.

"The aurora was of no definite formation, but extended to all portions of the sky; the arches, streamers, and patches blending harmoniously together so as to form one huge sheet of flame, through occasional openings of which stars of the first magnitude might be seen shining dimly, the light of all others being extinguished by the dazzling radiance of this remarkable phenomena.

"At the zenith, and extending downward for 30° on all sides, the sheet of light appeared without an opening, the edges being of great irregularity and shooting out slender pencils of radiant light. The movement in the mass soon became general, and the rapidity with which it would shift its position and assume new forms and phases was really startling to the observer. The gradually drifting changes which have generally characterized the auroras witnessed at this place were wanting in this one. A streamer would leap from the horizon, and passing through the zenith reach the opposite horizon with the quickness of thought; then receding, it would appear to swoop downward almost to the earth, taking new forms as it advanced, coiling and twisting in the most convulsive manner through the glorious canopy of the heavens, like a gigantic serpent. In the northern sky there gradually appeared an intense vermilion color, which expanded for 10° above the horizon, and remained for several minutes in this manner, its extreme brightness suggestive to the mind of a great conflagration.

"A few minutes earlier than the time which I have recorded Gardiner witnessed a display of unusual grandeur, and of which the latter is but a slight modification. It was of unparalleled brilliancy, and its light equal to the full moon. The prismatic colors were at one time discernible. Israel and Lynn also saw it when it was at its zenith of splendor, and both speak of its near approach to the earth, and the rapidity of its movements through the heavens." . . . . . .

Extract from the journal of D. L. Brainard, November 18, 1882:

. . . . . .

"Several auroral displays were observed to-day, one of which I was fortunate enough to witness at 12.30 P.M. It consisted of a complete arch extending from horizon to horizon (N. E. to S. W.) passing through the zenith. Its width at the horizon was about 5°, but

it expanded to 8° at the zenith. The illumination of the central portion of the arch was dull and subdued, but the edges were luminous with coruscations of light."

LIST SHOWING DATES ON WHICH AURORAS WERE OBSERVED BY THE LADY FRANKLIN BAY EXPEDITION AT FORT CONGER, GRINNELL LAND.

In 1881 : July 8th and 9th (in 50° 32′ N., 53° 05′ W.) ; September 21st ; October 16th, 19th, 22d, 25th, 26th, 28th to 30th inclusive ; November 10th, 20th, 23d to 25th inclusive, 27th, 28th ; December 5th, 11th, 14th, 17th, 19th to 21st inclusive.

In 1882 : January 10th, 11th, 19th, 21st to 23d inclusive ; February 1st, 11th, 15th, 17th, 19th to 21st inclusive, 23d ; October 2d to 4th inclusive, 6th, 7th, 9th, 10th, 22d to 24th inclusive ; November 4th, 6th, 7th, 9th to 11th inclusive, 13th to 19th inclusive, 21st, 29th ; December 1st to 12th inclusive, 14th to 17th inclusive, 28th, 29th.

In 1883 : January 1st, 3d to 9th inclusive, 13th ; February 10th, 14th, 18th, 24th.

APPENDIX XIV.

REPORT OF SERGEANT D. L. BRAINARD ON A PETRIFIED FOREST DISCOVERED MAY 20, 1883, NEAR CAPE BAIRD, 81° 30′ N., 64° 30′ W.

. . . . . .

"I DECIDED to remain at the Cape Baird depôt for a day for the purpose of hunting, but our efforts were not crowned with much success, although we hunted indefatigably. Only one hare was shot; one other, a seal, ptarmigan, and pair of turnstones were all the game seen. The track of one fox only was observed.

"The cliffs east of the depôt-tent I found to contain several species of fossils, a few of which are in our collection.

"While hunting along the shore of Archer Fiord, about four miles southwest of Cape Baird, I ascended the first of a series of low receding hills, the summit of which was about eight hundred feet above and one-half mile from the fiord. Its formation was of black sandstone, very brittle and easily crumbled between the fingers. By attrition of the wind and weather the rocks had been reduced to a fine sand, through which stratified ridges of the same general character occasionally protruded for a few inches.

"Near the summit of this hill I discovered the trunk of a petrified tree, about seven feet in length and five in diameter. It had broken into sections of four to ten inches each, but no piece was missing from its place. The diameter of the piece was much lessened by the loss of successive layers under action of the elements; it originally must have been at least ten inches. A section of this tree will be found in the collection marked No. 1. Further search revealed to me the existence of eleven trees, in the same state of petrifaction, within limits of a hundred square yards. The trunks of several of these trees were imbedded in the sandy soil, and portions varying from one to seven feet protruded above the surface.

Not having any instrument with which I could make an excavation, I had no means of ascertaining the length of the buried portion. In one instance, however, it must have been considerable, if the length was at all commensurate with the diameter. Only three feet of the body was exposed above the surface, and the diameter was about nine by sixteen inches, its end being of an oval form and bearing evidence of having been subjected to considerable pressure. This was the largest trunk seen, and was of a firmer structure than any of the others. The next in size was about twelve inches in diameter, of a very friable and brittle nature; of this I brought away a small specimen (No. 2). I also brought a specimen of sandstone (No. 3), which exhibits the general formation of the hill. Other similar pieces of rocks (package No. 4) bear impressions of fossil twigs, leaves, and stems.

"The entire surface of the hill was strewn about with small fragments of the petrifactions, many of which were crystallized. I subsequently discovered other specimens of fossil-wood at the base of the cliffs two miles from Baird; but, being already heavily loaded with specimens, I did not feel equal to the task of climbing a thousand feet up the steep incline to discover their origin."

APPENDIX XV.

REPORT OF SERGEANT HAMPDEN S. GARDINER ON THE FOSSILS COLLECTED AT CAPE CRACROFT.

LIEUT. A. W. GREELY, U.S.A., AND ASSISTANT COMMANDING LADY FRANKLIN BAY EXPEDITION:

SIR—I have the honor to make the following report in regard to specimens of fossils collected while at Cape Cracroft, Grinnell Land, during May 30 and 31, 1883:

All of the specimens were found in a bed of black fragmental rock, which when struck with the hammer broke into rough slabs or sometimes lumps. It was of exceeding fine grain, and could not be examined thoroughly without the aid of a microscope. The bed was at the base of the cliffs extending along the sea-level. It was traversed vertically by narrow seams of quartz.

The cliffs were two thousand feet or over in height, and very bold, showing the stratification in long waves, though sometimes much contorted and bent at sharp turns. It appeared to be composed of numerous layers of sandstone many feet in thickness, interspersed near the top by some lighter bands of rock.

With the aid of Dana's "Manual of Geology" I have been able to approximately determine most of the fossils as belonging to the Upper and Lower Silurian Periods.

Specimen No. 2 is similar to Fig. 362, p. 202, Dana's "Geology." The specimen was broken during transportation. When complete it measured seven inches in length and three inches in width. It is of a white substance, about one and three-fourths inch in width, forming a core, from which project a number of spines ex-

tending to the edge, where they are bounded by a very narrow edge or rim of white. There is a small indentation in top.

Specimen No. 3 apparently similar to M. bellicinta, Fig. 346, p. 201. It is portion of a conical shell. When complete the shell was probably five or six inches in length and three inches in diameter.

Specimen No. 4 consists of a portion of shell, being a horizontal section, showing the curve, and is about two inches in diameter. It is similar to Fig. 349, p. 201.

Specimen No. 5 similar to Columnaria alveolata, Fig. 318, p. 199. I observed many specimens of this fossil, some of which were a foot or more in diameter.

Specimen No. 6 is of a honeycombed appearance, and is very similar to Fig. 408, p. 224, Chætetes. A species of coral.

Specimen No. 7 similar to No. 6, and also to Chætetes lycoperdon, Fig. 320, p. 199. Many specimens were observed, some of which were three or four feet in diameter and a foot in thickness. In shape they were nearly flat on the bottom and rounded on top, being highest in the centre.

Specimen No. 8 is similar to Fig. 355, p. 201, Ormerceras tenuifilum. Many of this species seen, but it was difficult to obtain a good specimen. One which I observed was the length of a gun-barrel (three to four feet). It was probably much longer, as the ends were broken or disappeared in the rock.

Specimen No. 9 is eight inches in length, and one and a quarter inches wide at the broadest part, from which it gradually tapers to the smaller end. It appears to be a white core, from which project spines along the sides at spaces (intervals) of a quarter of an inch.

Specimen No. 10 is a confused mass of small, round pieces of coral rock, a quarter of an inch in diameter, and some of the pieces (may be complete) two inches in length. These pieces have a small black core through the centre.

I observed several specimens exactly similar to Fig. 477, p. 246. They were from a half inch to an inch in diameter, consisting of a narrow band or rim of white, from which numerous spines projected toward the centre.

During my stay at Cape Cracroft the violent wind-storm, which continued during the whole time, was an effectual drawback to a

close examination of the higher stratification. The rocks were falling continually, making it dangerous climbing along the face of the cliff.

Duplicates of all the fossils were obtained, and I have picked from the number a representative specimen of each kind. They have been packed separately, and marked according to the foregoing list, and are returned with the report.*

I am respectfully yours,

HAMPDEN S. GARDINER,

Sergeant, Signal Service.

---

* The above specimens were examined by me in connection with Sergeant Gardiner, both with magnifying-glass and microscope. My opinion concurred fully with his in referring the specimens to the cuts named. It is to be understood that neither of us had any knowledge of geology other than was obtained from a cursory study at Fort Conger.

A. W. GREELY, *Lieutenant.*

APPENDIX XVI.

LIST OF GAME OBTAINED BY THE LADY FRANKLIN BAY EXPEDITION WITHIN THE ARCTIC CIRCLE.

Date.		Ice-Bears.	Wolves.	Foxes.	Ermines.	Lemmings.	Musk-Oxen.	Hares.	Seals (phoca barbata).	Seals (phoca hispida).	Seals (bladder-nose).	Brent Geese.	King Ducks.	Long-tailed Ducks.	Guillemots.	Dovekies.	Ravens.	Owls.	Skuas.	Ivory Gulls.	Burgomaster Gulls.	Sabine's Gulls.	Ptarmigan.	Turnstones.	Knots.	Sand-Pipers, purple.	Sanderlings.	Arctic Terns.	Gray Phalarope.	Eider Ducks.	Diver, red-throat.	Salmon.
1881	July	1	...	...	...	...	...	...	1	...	...	...	...	...	700	50	...	...	...	5	...	...	...	...	...	...	...	...	...	22	...	...
1881	August	...	...	...	...	...	16	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...
1881	September	...	5	...	...	...	10	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1882	February	...	...	...	...	...	...	7	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1882	March	...	...	...	...	1	...	4	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1882	April	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
1882	May	...	...	...	...	2	3	1	5	...	...	...	...	...	...	...	...	...	...	...	...	...	6	...	...	...	...	...	...	...	...	...
1882	June	...	...	1	...	4	18	11	1	...	...	5	17	6	...	20	...	...	20	...	2	...	7	7	...	...	...	1	...	...	...	...
1882	July	...	...	...	4	...	10	2	...	...	...	27	...	3	...	...	...	14	118	...	...	1	...	6	...	1	...	5	...	19	...	...
1882	August	...	...	...	2	...	33	11	...	2	0	37	5	6	...	13	...	2	40	...	1	...	32	54	18	...	1	3	...	7	...	1
1882	September	...	...	3	1	...	1	2	...	3	...	...	...	...	...	...	1	1	...	...	...	...	3	1	...	...	...	...	...	...	...	...	...
1882	November	...	...	1	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

1882	December								1																						
1883	February						1																								
1883	March			1			3																								
1883	April						2																4								
1883	May					3	7		2														11								
1883	June	1	2		8	2		1		12	14	27		21		1			3		15	28	8			12	1	1	1		
1883	July			1		3				2	8	5										3	2				1				
1883	August							3																							
1883	September							9	1																						
1883	October		3					3														2									
1883	November		10					1																							
1883	December		8																												
1884	January		1																												
1884	February		1																												
1884	March		1											51							10										
1884	April	1						1						11							6										
1884	May													2	1						2										
1884	June												2	4																	
	Totals	2	6	32	8	8	103	57	7	27	1	83	44	47	702	172	2	18	178	5	6	1	99	99	28	1	1	21	2	49	1	1

NOTE: Game from August 1, 1881, to July 31, 1883, obtained north of latitude 81° 31′ N.

GRINNELL LAND.
LINCOLN
SEA
GRANT LAND
GARFIELD
COAST
GRINNELL
HALL BASIN
HALL LAND
WASHINGTON LAND
ARTHUR LAND
KANE BASIN
INGLEFIELD LAND
ELLESMERE LAND

INDEX.

Adams, Captain William, i. 3
Adams River, i. 393
"Advance," i. 6
Ægialitis hiaticula, see Plover
Air samples, i. 132
Albert, Cape, ii. 118
Alca arra, see Guillemots, Bruennich
Alcohol, effect of low temperatures on, i. 188
Alcohol sledge ration, i. 298
Aldrich, Lieutenant Pelham, R.N., i. 14, 15, 116, 331, 335, 401, 416
"Alert," i. 13, 192; winter-quarters of and cairn at examined, 249; ii. 93
"Alexander," voyage of, i. 4
Alexander, Cape, i. 25, 62
Alexander Ramsay, Cape, i. 337
Alexandra Harbor, expedition to, ii. 260, 262, 264, 265
Alexandra, Lake, i. 93, 418, 419; fish in, 122, 425
Alfred Newton glacier, ii. 152; description of, 161
Allman Bay, i. 416; ii. 108
Ames, P. A. Surgeon Howard, U.S.N., ii. 334
Amusements, i. 164, 175, 193; character of, 145, 162, 164
Anemometer, i. 126
Animalculæ, i. 116
Antarctic icebergs, described, ii. 47
Appleby, Charles, i. 38
Appleby, Lake, i. 372, 373
Archer Fiord, i. 78, 79, 258, 426; explored, 421
Archer, Lieutenant, R.N., i. 15, 107, 258, 264, 267, 401, 402, 422
"Arctic," voyage of, i. 3
Arctic Highlanders, Eskimo, so named by Ross, his description of, i. 4
Arctic ice-cap, ii. 60
Arctic night, i. 116, 122; intensity of the darkness, 155; depressing influence of, 167–169
Arthur, Mount C.A., i. 399, 399 *n.*; ascent of, 399
Arveprins Island, i. 50; bird-cliffs of, 48
Asphyxiation, lives of party at Camp Clay endangered by, ii. 272
Atholl, Cape, northerly currents at, i. 61
Augspadlarsok ice-fiord, i. 54
Auks, i. 49, 53
Aurora, i. 120, 164; ii. 181, 197, 218; described, 157–159, 184

Bache Island, ii. 119, 265, 266; the scenery at, i. 67
Back Cape, ii. 81
Back's voyageurs, weight carried by, i. 198
Baffin Bay, discovered by Baffin, i. 3
Baffin, William, discoveries of, i. 2, 62
Baggage, upon the retreat, ii. 67
Baird, Cape, i. 72, 202; expeditions to, 419, 426; position of, determined, ii. 25; depôt established at, 61; reached on retreat, 74; records left at, *ib.*

Baird Inlet, ii. 148
Baker, Cape, ii. 265, 267
Banks Land, ii. 60
Barentz Sea, i. 19
Barometer observation at Camp Clay, ii. 307 *n*.
Barrae, M., i. 289
Barrington, i. 3
Barrow, Sir John, i. 3
Basil Norris Bay, i. 93, 103, 413
Bath, use of, i. 142
Bear, killed, i. 57; ii. 290; visit the station, 4; consumes depôt supplies, 243; traces of, i. 331, 346; ii. 36, 96, 104, 129, 130, 135, 149, 198, 240, 258, 259, 268; seen, 305
Bear-trap ruins, i. 51
Beatrix Bay, i. 258; cliffs of, ii. 31
Beaufort, Sir Francis, i. 6
Beaufort, Mount, i. 148
Beaumont, Lieutenant L. A., R.N., referred to, i. 102, 198, 218, 307, 314, 316, 317, 321; ii. 62; his explorations, i. 16; record of, left at Repulse Harbor, 343-346; facsimile of record, 345; cairn of, at Cape Baird, ii. 75
Beaumont Island, i. 322, 325
"Beaumont" (boat), adrift, ii. 100
Bedford Pim Island, ii. 162, 250, 268
Beebe, Mr., i. 421
Beechy, Cape, depôt "B" established at, i. 100, 110; ice-floes at, 149; expeditions to, 147, 213, 417; position of, determined, ii. 25
Behring Strait, ii. 44
Belcher, Sir E., i. 197, 258
Bellot Island, i. 93; temperatures at, 166
Bellows Valley, i. 93, 418; explorations in, 103, 106, 357
Beluga catodon, see Whales, white
Bender, Private Jacob, referred to, i. 108, 260, 269, 277, 287, 291, 384, 408, 409; ii. 14, 130, 141, 184, 196, 197, 205, 219, 228, 232, 242, 243, 244, 247, 250, 251, 258, 259, 262, 272, 301, 304, 315; sent to Conybeare Bay, i. 259; explores Black Rock Valley, 366; re-enlists, 352; excused from religious services, ii. 6; insubordination of, 235; mutinous conduct of, 302; death of, 320
Benêt, Cape, i. 329
Berne International Polar Conference, i. 21
Bernicla Brenta, see Geese, brent
Bessels, Dr. Emil, i. 11, 12, 217; ii. 95
Bessels Bay, ii. 79
Biederbick, Hospital Steward Henry, referred to, i. 150, 152, 161, 166, 177, 193, 235, 260, 295, 302, 366, 367, 368, 373, 375, 376, 388, 391, 392, 393, 394, 406; ii. 12, 65, 68, 171, 181, 200, 209, 219, 252, 258, 276, 292, 322, 323, 327, 328, 330, 332, 337; birthday of, 229; lost, 300; discharged from service, 325; re-enlisted, 326; sent into Black Rock Vale, 366
Biederbick Island, i. 393
Biederbick Lake, i. 373
Bifurcation Cape, i. 103, 368
Bills of fare, i. 140
Bird-cliffs, i. 48, 77
Birds, see Auks, Brueunich Guillemots, Dovekie, Fulmars, Gulls, Looms, Ptarmigans, Ducks, Falcon, Tern, Boatswain, Owl, Brent, Snow-Bunting, Ringed Plover, etc.
Birthdays, how observed, i. 119
Bismarck, Cape, i. 25, 27
Bismarck, Prince, i. 20
Bixio, M., i. 289
Black Cape, i. 250, 312
Black Horn Cliffs, i. 311, 312; disintegration of polar pack at, ii. 19; ascended, 21; open water at, 22
Black Rock Vale, i. 93, 259, 418; explorations in, 366-375, 409-412; fording the river in, 411

Boats, assignment of retreating party to, ii. 75; nipped by ice-floes, 97; adrift, 100; beset in the ice, 101, 108; injured by ice, 102; abandoned, 122, 129
Boatswain, i. 77
Bounty to whalers, ii. 330
Brainard, Cape, ii. 38
Brainard, Sergeant David L., referred to, i. 54, 82, 99, 103, 109, 112, 113, 147, 150, 152, 164, 168, 171, 172, 191, 194, 296, 300, 306, 316, 322, 326, 336, 342, 360, 362, 417, 418, 419, 425, 427; ii. 12, 17, 21, 25, 31, 36, 37, 38, 41, 52, 61, 64, 65, 66, 71, 83, 89, 92, 94, 97, 98, 127, 129, 131, 143, 149, 161, 197, 199, 208, 209, 213, 218, 219, 238, 243, 254, 259, 260, 261, 262, 267, 268, 269, 274, 276, 277, 279, 282, 283, 289, 290, 292, 296, 297, 301, 303, 304, 305, 307, 309, 310, 312, 320, 323, 324, 325, 326, 327, 328, 331, 337; establishes depôt at Cape Beechy, i. 100; trip of, into interior of Grinnell Land, 108; re-enlists, 117; ascends Mount Ovibos, 122; Mount Campbell, 166, 179; birthdays of, 170; ii. 213; accompanies Lockwood to Cape Beechy, i. 213; accompanies expedition to Thank God Harbor, 215; commands the expedition to The Gap, 229; selection of, for North Greenland coast exploration, 295, 320; ii. 18; accompanies Lockwood across Grinnell Land, 27; consulted by commanding officer, 115, 121, 128, 137; sent to the relief of Elison, 190; sick, 220, 239; trip of, to Rosse Bay, 271; appointed second in command, 291, 293
Brainard Island, i. 334
Bravois, i. 289
Brevoort Island, ii. 145, 240
Brent, see Geese, brent
Britannia, Cape, i. 316, 322, 325; view from, 326; records deposited at, 340
Brown, Dr. Robert, i. 59
Bruennich guillemots, see Guillemots
Bryan, R. W. D., i. 11, 12, 217
Bryant, Cape, i. 251; Beaumont's cache discovered, 342
Buch, Cape L. von, ii. 82
Buchanan Strait, i. 66; ii. 162, 169, 264
Buddington, S. O., i. 11, 12
Bumblebees, i. 372, 385
Burgomaster, see Gull, glaucous
Buttercup, i. 81
Butterflies, i. 372, 373, 378, 385, 404
Buys Ballot glacier, i. 340

CAIRN found, ii. 98
Cairn Hill, i. 91
Cairn Point, ii. 141
Cairns erected, i. 74, 332, 336, 403; ii. 74
Camp Clay, construction of hut at, ii. 171; plan of, 173; winter supplies and rations at, 195, 241; removal from hut to tent, 306
Campbell, Mount, i. 93, 166, 193
Camperdown, Cape, ii. 52, 118, 119
Cañon, see Lost River Cañons
Canvas, retreating boats supplied with, ii. 76; Indian tepee made of, 116
Cap, see Head-covering
Carey, Mount, ii. 262, 266
Carl Ritter Bay, depôt established at, i. 72; description of, 73; sledge trip to, ii. 6, 7; cache taken up, 82; struggle with ice in, *ib.*, 91
Carpenter, W. B., i. 349; article of, from *Nineteenth Century*, ii. 55
Cart, found at Water-course Bay, i. 102; advantages of, for Arctic work, 103
Cartmel, Mount, i. 91

Cary Islands, i. 3; Nares' cairn at, examined, i. 60
Cascade Ravine, i. 92
Caterpillars, i. 116
"Challenger," ii. 47, 55
Challenger Mountains, i. 401, 416
Chandler Fiord, i. 267, 269–271; ice-dam of, 272; packed ice in, 424
Chandler, Secretary, i. 267; ii. 336
Chester, H. C., i. 11, 12
"Chinese Wall" glacier, see Mer de Glace Agassiz
Chipp Inlet, i. 327
Christiansen, Thorlip Frederik, Eskimo, referred to, i. 106, 147, 211, 213, 215, 240, 295, 311, 313, 314, 315, 316, 320, 321, 322, 325, 326, 360; ii. 3, 12, 22, 39, 61, 87, 102, 111, 133, 144, 151, 161, 171, 204, 212, 232, 237, 264, 266, 267, 268, 270, 275, 277, 336; joins expedition, i. 52; accompanies Lockwood to Cape Beechy, 213; to Thank God Harbor, 215; trip to Archer Fiord, 360; accompanies second expedition to North Greenland coast, ii. 18; accompanies Lockwood across Grinnell Land, 37–42; kills seal, 134, 139, 180; detailed as hunter, 156; trip to Cape Isabella, 165; sent to the relief of Elison, 190; accompanies Long to Alexandra Harbor, 260, 262, 264; taken sick, 269, 277, 278; death of, 279
Christmas, how celebrated, i. 171–176; at Camp Clay, ii. 215
Chronograph, i. 130
Chronological table, ii. 228, 230
Chubs, i. 116
Cladonia rangiferina, see Moss Reindeer
Clam found, ii. 151
Clay, Henry, i. 48, 82; ii. 177, 215; returns to the United States, 84
Clements Markham Inlet, i. 416; ii. 48
Clothing, i. 162, 208–211; worn on the expedition to the "Farthest North," 295
Coal, i. 82, 85, 99, 107, 367, 373; Disco coast mines, 51; landed at Littleton Island, 63; seam of, 356, 358
Cobb River, i. 385, 387
Cochlearia fenestrata, i. 364
Cocked Hat Island, ii. 121, 264; efforts to reach, 125
Collinson, Admiral, R.N., ii. 60
Collinson, Cape, i. 72; English Cache at, ii. 98, 99
Columbia, Cape, i. 251, 252, 331
Colwell, Lieutenant, U.S.N., ii. 334
Conger Inlet, i. 337
Conger Mountains, i. 393, 400
Conger, Senator, i. 37; station named after, 84
"Congress," i. 10
Congress of the United States, wise act of, ii. 335
Conical Hill, palæocrystic ice at, i. 252
Connell, Private Maurice, referred to, i. 54, 101, 121, 133, 141, 193, 260, 261, 264, 269, 274, 276, 277, 282, 292, 295, 299, 303, 357, 358, 361, 362, 425; ii. 14, 25, 65, 97, 109, 110, 147, 150, 161, 184, 238, 239, 277, 292, 297, 313, 322, 323, 324, 326, 327, 329, 332; re-enlists at Upernivik, i. 52, 100
Connell, Mount, i. 392
Constant weights of North Greenland coast expeditions, i. 306; ii. 18
Constitution, Cape, ii. 86
Consultation of officers, ii. 115, 121, 128, 133, 137
Conybeare, Lieutenant, R.N., i. 104
Conybeare Bay, i. 259; explored, 261
Corona, i. 186
Craig, Lake, i. 374
Cracroft, Cape, ii. 79; expeditions to, i. 419; ii. 25; fossils at, i. 419; ii. 25
Crantz, i. 25

Cross, Sergeant William H., referred to, i. 101, 260, 263; ii. 12, 65, 116, 141, 144, 171, 211, 217; expedition to Conybeare Bay, i. 259; ear frozen, 165; drunkenness of, ii. 81, 82, 88, 166; mutinous conduct of, 86; relieved from duty, 88; has scurvy, 220, 222; sickness of, 223; death of, 224; burial of, 225
Crustaceans, i. 73, 342; at Camp Clay, ii. 276
Cryolite, i. 28
Cystophora cristata, see Seal, bladder-nose

DADDY-LONGLEGS, i. 116
Dan, Cape, i. 27
Davis, John, i. 51; discoveries of, 1, 2
Davis Strait, ice-floes of, i. 41; temperature of water, 42
Decoration Day, English graves decorated, i. 360
Defosse, Cape, i. 426; ii. 80
De Long, i. 100; ii. 60
De Long Fiord, i. 332, 340
Depot "A" established, i. 102
Devil's darning-needle, i. 385
Dew-point experiments, i. 132
Diarrhœa, men attacked by, ii. 141, 142, 144, 145, 244
Diary, last entry in, ii. 329
Dietary of the expedition, i. 137–142
Difficult, Mount, ascended, ii. 29
Dijmphna, i. 23, 349
Dip-circle observations, i. 128
Discipline, ii. 235; breach of, i. 426; ii. 5, 66, 81, 86, 114, 132, 157, 160, 228, 293, 302
Disco, arrival at, and description of, i. 43
Disco Bay, i. 50
Disco King (dog), faithfulness of, ii. 39
"Discovery" (of Baffin), voyage of, i. 2
"Discovery" (of Nares), i. 13
"Discovery" (boat), taken to The Gap, i. 229–237
Discovery Harbor, arrival at, i. 79; maximum temperature of the earth at, 81; description of, *ib.*
Distant Cape, i. 109, 331
Doane, Lieutenant, U.S.A., i. 22
Dobbin Bay, i. 68, 71; ii. 103–104
Dog-drivers engaged, i. 52
Dogs, Eskimo, their importance, i. 46; traits of, *ib.*, 189; ii. 10; teams of, purchased, i. 46, 47, 48; pups born, reared, and trained, 159; effects of kind treatment upon, 160; food and condition of, the second winter, ii. 16; steal and eat their harness, 17; food left for them at Conger, 71; their powers of endurance, 150, 170, 189; disease among, 197; supplies stolen by, 300, 304, 311, 326, 332; viciousness of, 339, 341, 342
Dovekies, seen, i. 49, 73, 77, 364; ii. 268, 270; killed, 80, 268, 277, 279, 309, 310, 312, 314, 315, 320, 323
Dragon Point, i. 321
Drift Point, i. 311, 312; young ice at, ii. 21
Drift-wood found, i. 61, 100, 106, 108, 110, 309, 369, 376, 422; ii. 98, 329
Drifting on the floe, ii. 145
Drinking-water, melted ice used for, i. 116, 144
Dryas, i. 81, 273, 286, 370, 371, 405
Ducks, seen, ii. 320, 327; long-tailed, seen, 312, see also Eider, King, and Long-tailed
Dust-storm, i. 410
Dutch Island, i. 91
Dyas Island, i. 389

EAGLE, i. 307, 353
Efflorescence, ii. 51

Egerton, Lieutenant, i. 192, 245
Eider-duck, i. 65, 81, 103, 364; ii. 149; seen, 310; nest of, found at Camp Clay, 326
Elberg, Governor, i. 52, 54, 55
Elison Island, i. 340
Elison, Sergeant Joseph, referred to, i. 193, 295, 306, 311, 316, 424, 426; ii. 27, 65, 116, 179, 183, 184, 187, 239, 249, 256, 267, 269, 278, 304, 323, 325; hands and face burned, i. 161; courage of, during sickness, ii. 17; reprimanded, 157; rendered helpless by frost-bite, 188; portrait of, 191; rations for, 203; foot and finger amputated, 218; birthday, 220; death of, 334
Ella Bay, i. 421; ii. 28
Ella Valley, ii. 29; glacier in, 29, 52; cliffs of, 31
Ellesmere Land, discovered by Baffin, i. 3
Ellis, Private William A., referred to, i. 148, 150, 241, 242, 418; ii. 87, 153, 161, 214, 226, 230, 242, 243, 247, 253, 260, 264, 271, 277, 283, 292, 304; accompanies second expedition to North Greenland coast, ii. 18; birthday celebrated, 177; sent to the relief of Elison, 190; has scurvy, 220; death of, 305
Emory, Lieutenant W. H., Jr., U.S.N., ii. 333, 334
Emory, Cape, i. 328
Envall, Dr., i. 139
Equipment and supplies of expedition, i. 38, 39
Ermine, caught, ii. 4; tracks of, 10, 12, 28; killed, 16
Eschricht, Dr., i. 77
Eskimo, number of, on east coast of Greenland, i. 27; described, 30–33; houses of, 45; mortuary custom, 65; powers of endurance of, 246; value of, for sledge journeys, 244; old encampments of, 410, 420, 422; ii. 7, 94, 98, 277; Etah, 234
Eskimo relics, i. 360–362, 367, 376, 420, 426; ii. 75, 278; found at Cape Sabine, 322; sledge-runners, 377; traces of fire, 386; reindeer-skin, 392
Eskimo ruins, i. 65; traces of, 28; abandoned huts, 379; description of, 381; diagram of, 382
Exercise, how obtained, i. 143; results of violent, 351

Falco candicans, see Falcon, Greenland
Falcon, Greenland, i. 73, 78, 423; ii. 96
Famine in Greenland, i. 33
Farewell, Cape, i. 25, 27, 35
Farthest North, i. 335
Feilden, Major H. W., R.A., ii. 94, 260
Feilden Peninsula, i. 238, 251
Fire, destroys tent and stores, i. 121, 161
Fish, observed in lakes, i. 98, 116, 122, 279, 418, 425
Flammarion, i. 289
Flies, i. 116, 369, 372, 374
Floeberg Beach, i. 179, 250
"Florence," i. 21
Flowers at Carl Ritter Bay, i. 73
Foehn, i. 52; ii. 10
Fog, i. 43, 47, 52, 57, 72, 78, 117, 292, 397, 404; ii. 78, 80, 93, 99, 103, 104, 139, 167; deception caused by, 118 *n*.
Food-supply of the expedition, i. 136–138; second winter's allowance, ii. 1
Foot-gear, i. 209; made from seal-skin, ii. 64
Fort Conger, description and plan of house, i. 88–91; surrounding country, 91–94
Fossil-forest at Cape Baird, ii. 25

Fossil Mountain, ii. 37
Fossil-rocks, i. 346
Fossils, i. 419; taken from coal-slate, 356; shell found, 363; ii. 37
Fox, traces of, i. 73, 98, 251, 275, 276, 283, 323, 328, 329, 330, 338, 340, 341, 356; ii. 3, 9, 12, 28, 36, 39, 93, 161, 251, 258, 261, 262, 264, 268; seen, i. 157, 346, 353; ii. 110, 131, 156, 166, 218, 219, 231, 235; caught, 3, 4; depredations of, 6; killed, i. 352; ii. 163, 171, 184, 185, 196, 197, 200, 202, 204, 208, 211, 212, 213, 216, 219, 236, 274
Francis Long, Cape, ii. 262
Frankfield Bay, i. 315
Franklin, Sir John, i. 197; ii. 80, 315
Franklin Island, i. 72
Franz Josef Land, discovery of, i. 20
Frazer, Cape, i. 71
Frederick, Cape, i. 327, 328
Frederick, Sergeant Julius R., referred to, i. 150, 160, 172, 295, 306, 316; ii. 102, 116, 209, 214, 230, 231, 232, 238, 243, 246, 249, 252, 257, 260, 278, 302, 303, 305, 337; promoted to be sergeant, 257; trip of, to Baird Inlet to recover abandoned meat, 281–287; re-enlists, i. 117; assigned to duty as engineer, 427; ii. 82, 88; trip to Cape Isabella, 187
Frost-bite, i. 152; how avoided, 209, 211
Fulford, Cape, i. 316
Fulmar, i. 49
Funk Island, i. 41
Floebergs, i. 111, 242; ii. 77, 80, 83, 86, 100–103; described, i. 342; examined, ii. 23; seen, 36; passage through a, 84
Floe-ice, i. 112; ii. 98, 100, 104; described, 43, 44, 45

Gales, i. 300, 302, 303, 304, 311, 418; ii. 71, 74, 75, 83, 84, 118, 132, 142, 145, 146, 148, 153, 183, 206, 207, 208, 212, 217, 228, 239, 249, 251, 253, 254, 258, 259, 260, 270, 276, 278, 284, 285, 301, 304, 309, 310, 312, 314, 325, 327, 329
Gap, i. 216; depôt established at, 228; the "Discovery" taken to, 229–231, 234–237
Gap Valley, i. 306
Gardiner, Sergeant Hampden S., referred to, i. 39, 102, 106, 130, 131, 132, 148, 419; ii. 25, 49, 65, 95, 113, 170, 183, 210, 211, 242, 248, 268, 270; breaks his leg, i. 166; returns to duty, 190; injury to finger, ii. 153, 157, 168, 185; birthday of, 226; sickness of, 292, 322, 323; death of, 324; character of, 325
Garfield Mountains, i. 276, 372, 391, 393, 400, 416; ii. 32
Garlington, Lieutenant, ii. 193, 196 *n.*, 215, 216; records of, at Cape Sabine, 162–164, 232
Geese, brent, seen, i. 77, 364, 370, 374, 376; killed, 417; ii. 73, 311
Gilman, Daniel C., i. 38
Gilman glacier, i. 409
Glaciers observed, i. 281, 326, 328, 329, 340, 366, 373, 374, 384, 396, 422; ii. 21, 29, 31, 34–37, 265
Godhavn, i. 30; arrival at, 43; description of, 43–47
Godthaab, described, i. 29, 42
Goggles, necessity of wearing, i. 211
Goose, brent, killed, ii. 323
Gorge Creek, i. 306
Graah, i. 27, 35
Grant, Mount, i. 399 *n.*
Grasses, i. 81, 282, 370, 371, 391; ii. 37
Greely Fiord, discovered, ii. 35; described, 36; floebergs in, 55
Greely, Mrs. A. W., i. 172; flag of, unfurled at the Farthest North, 337
Green, P. A. Surgeon Edward, U.S.N., ii. 334

Greenland, rediscovery of, i. 1; described, 25–35; first sight of, 42; expedition to north coast of, 295–347; physical geography of, 348, 416; second expedition to north coast of, ii. 18–25
Greenland sledge, i. 199, 200
Grinnell, Henry, i. 6
Grinnell Land, first sight of, i. 74; Lieutenant Archer's account of, 258; expeditions into the interior of, 260–293, 366–416; physical geography of, 293, 414; as seen from Mount Arthur, 400; Lockwood's expedition across, ii. 27–42; view of, from Mount Difficult, 29; water-shed of, 34
Guillemots, Bruennich, i. 48, 53; seen, ii. 315; killed, 324
Gull, glaucous, i. 49, 78, 364, 409; ii. 110; seen, 303, 307
Gull, Iceland, i. 356
Gull, ivory, i. 77; ii. 93
Gull, robber, see Skua
Gull, Sabine, killed, i. 417
Gulls, i. 376
"Gulnare," i. 22
"Gypsy" (dog), i. 163, 300

Hair, cutting of, ii. 259
Hakluit's Ile, i. 3, 62
Haliaetus albicilla, see Eagle
Hall Basin, i. 149
Hall, C. F., expedition of, i. 10; condition of the grave of, 218
Hamburg International Polar Conference, i. 21, 124
Hand, condition of the grave of, i. 218
Hand Bay, i. 315
Hans, Hendrik, i. 6
Hans Island, i. 78
Hare, killed, i. 99, 191, 280, 330; ii. 16; seen, i. 372; ii. 7; traces of observed, i. 73, 157, 191, 249, 251, 275, 276, 328, 329, 333, 338, 340; ii. 9, 11, 12, 13, 28, 39, 328; tenacity of life of one wounded, i. 351; peculiar manner of travelling, 192
Hare Island, i. 57
Harelda glacialis, see Long-tailed duck
Harley Spit, i. 256; palæocrystic ice at, 252
Hawks, Cape, English depôt examined, i. 68; temperature of water, 70; vegetation, 71; reached, ii. 105; English depot at opened, 107
Hayes, Dr. I. I., i. 7, 62, 67; ii. 95, 315; expedition of, 8–10
Hayes Point, reached, ii. 103
Hayes Sound, ii. 265, 266, 267
Hazen, General W. B., U. S. Army, i. 22, 37; ii. 192
Hazen, Lake, discovery of, i. 275; country about explored, 277–281, 290, 375, 408; ii. 32; ice of, described, 48
Head-covering, i. 210
Heather, beds of, i. 408
Hecla, Cape, i. 251, 253
Heintzelman, Lake, discovered, i. 366; size of, 371; sledge-trip to, ii. 4
Henrietta Nesmith glacier, description of, i. 282–288, 388; mist at, 405; ii. 32; earthy substance noted in, 52
Henry, Private Charles B., referred to, i. 65, 118, 133, 163, 295, 299, 362; ii. 65, 98, 184, 209, 228, 248, 258, 270, 277, 301; sent into Black Rock Vale, i. 417; birthday of, ii. 254; suspected of stealing, 274, 275; relieved from duty, 274; cautioned, 316; appropriates alcohol 298; becomes intoxicated, *ib.*; execution of, 315, 316, 317, 318
Hillock Depôt, of Lieutenant Archer, i. 360; ii. 28; cache, i. 422
Hoffmeyer, Cape, i. 332; records deposited at, 340
Hogback (The), i. 91, 123

Hooker, Sir J. D., i. 258, 414
House at Fort Conger, description of, i. 88; banked with ice, 156; arrangement of quarters in, 180
Houses built by retreating party, ii. 158; at Bedford Pim Island, 172; plan of, 173
Hovgaard, A. P., i. 23
Howgate, Captain H. W., i. 21
Howgate Island, i. 221
Hudson, Henry, i. 335
Hudson Bay sledge, i. 198, 298, 299
Hummock-ice, i. 72, 214
Hunt Fiord, i. 337
Hunt, Lieutenant Henry, U.S.N., i. 199

Ice, ii. 72, 73; inland of Greenland, i. 26, 27, 30, 35, see also Floe, Floebergs, Palæocrystic, Icebergs, Ice-fields, Rubble, etc.
Ice-belt of Greenland, i. 27
Icebergs, i. 68, 72; described, ii. 46
Ice-boat brought from Thank God Harbor, ii. 62
Ice-cap near Alexandra Harbor, ii. 265
Ice-dam, i. 272
Ice-fields, ii. 72, 73, 74
Ice-floes, i. 66; description of, 41, 42; beset by, 77, 78
Ice-foot, i. 111, 315; ii. 84, 96–98, 101, 188; described, 43
Ice-pack, i. 66; stopped by, 74
Ice-streams of Davis Strait, i. 34
Ida Bay, discovered, i. 268; launch expedition to, 423
Inglefield, Admiral, R.N., i. 61, 62, 335; voyage of, 5
Inspectorates of Greenland, i. 28
Insubordination, see Discipline, breach of
International Polar Conferences, i. 21
International Polar Stations, list of, i. 23
"Investigator," i. 349
"Isabel," voyage of, i. 5; ii. 194
"Isabella," voyage of, i. 4
Isabella, Cape, ii. 137; trip to, 165; cache at, 169; the trip for supplies, 187
"Isjbörn," i. 19
Israel, Sergeant Edward, referred to, i. 39, 121, 130, 132, 259, 357, 419, 424; ii. 71, 102, 109, 113, 119, 130, 132, 137, 141, 185, 217, 223, 245, 262, 292, 305, 307, 309; freezes feet, i. 180; explores Bellows Valley, 357; breaks through the ice, ii. 3; reprimanded, 160; apology of, 161; death and character of, 310

Jakobshavn ice-fiord, i. 30, 50
James Ross Bay, i. 238, 251
"Jeannette," i. 239, 349; ii. 13
Jelly-fish, i. 422
Jens Edward, Eskimo, joins expedition, i. 52; referred to, 103, 108–111, 148, 191, 215, 227, 228, 238, 247, 254, 256, 257, 357, 418; ii. 3, 12, 27, 83, 118, 149, 151, 202, 241, 243, 268–271, 277, 280, 290, 297, 298; expedition to Wrangel Bay, i. 150; disappears from station, 168; kindheartedness of, 228; seal-hunting, 355; kills seal, ii. 111, 134, 140, 142; trip of, to Cape Sabine, 151, 153; detailed as hunter, 156; sent to the relief of Elison, 190; attempts with Rice to reach Littleton Island, 236, 240; drowning of, 299; character of, 300
Jewell, Sergeant W. S., referred to, i. 39, 101, 112, 132, 178, 215, 223, 240, 295, 306, 309, 314; ii. 49, 72, 102, 103, 216, 227, 228, 230, 238, 239, 242, 243, 246, 261, 262; supports Dr. Pavy, i. 241; service in Robeson Channel, 242; assists in establishing depôt at Cape Sum-

ner, ii. 17; accompanies second expedition to North Greenland coast, 18; his tidal readings, 24; birthday celebrated, 134, 139; sent to the relief of Elison, 190; has scurvy, 224; sickness of, 280; death of, 289
Jewell Inlet, i. 332
John's Island, i. 277, 373
Joiner Bay, ii. 99
Jolliffe glacier, ii. 94
Jones Sound, discovered by Baffin, i. 3
Joseph Good, Cape, ii. 95
Joseph Henry, Cape, ii. 94; expeditions to, i. 110, 238; condition of ice at, 251
Joy Point, ii. 103
Judge Daly Peninsula, divide of, ii. 7
Julianehaab, i. 30

Kaiser Franz Josef Fiord, i. 27
Kakortok Church, ruin of, i. 30
Kane, Elisha K., U.S.N., i. 62, 165, 169; expedition of, 6
Kane, Cape E. K., i. 334, 337
Kangek peaks, i. 50
Kara Sea, ii. 44
Keilson, i. 26
Kennan, George, i. 158
Kennedy Channel, ii. 60, 79, 95; entered, 77
Kelp, ii. 303
Kilbourne, Lake, i. 374
King ducks, i. 364, 374; flock of, 375; seen, ii. 309, 310, 315
King Oscar Harbor, i. 28
Kislingbury, Lieutenant Frederick F., referred to, i. 38, 39, 53, 57, 60, 73, 103, 115, 118, 122, 150, 170, 195, 298, 419; ii. 64, 65, 87, 97–99, 110, 112, 129, 130, 145, 152, 167, 209, 235, 243, 246, 252, 255, 259, 262, 268–270, 277, 283, 292, 305, 310; visits Polaris quarters at Life-boat Cove, i. 64; relieved from duty at his request, 85; expedition to Wrangel Bay, 150; visit to Cape Murchison, anxiety in regard to, 185; goes to Mount Campbell, 193; trip of, to St. Patrick Bay, 423; discusses situation with enlisted men, ii. 114; consulted by commanding officer, 115, 122, 128; detailed as hunter, 156; ruptured, 196, 197, 202; birthday of, 215; ordered to duty, 289; mental incapacity of, 291, 300; death of, 312
Knife Edge, i. 368
Knot, i. 364; killed, ii. 86
Kryolite, see Cryolite
Kumlein, Ludwig, i. 364

Lady Franklin Bay, station at, authorized by Congress, i. 22; arrival in, 78
"Lady Greely," see Launch
Lagopus rupestris, see Ptarmigan
Lamp, alcohol, for cooking, i. 196, 206
Lancaster Sound, discovered by Baffin, i. 3
Land reached from the drift-ice, ii. 149
Larus glaucus, see Gull, glaucous
Larus leucopterus, see Gull, Iceland
Launch, "Lady Greely," i. 75, 117; trips with the, 52, 419, 421, 423, 425; grounding of the, 421, 427; ii. 81, 93; nipped by ice-floes, 73; accident to the engine of, 91; nipped by ice-floes, 97, 111, 112, 118; injured, 99, 102; abandonment of, 121, 122
Lawrence, Cape, ii. 91, 95
Leconte Island, ii. 149, 153
Lectures during the winters, i. 146; ii. 201, 204
Leffert glacier, ii. 53, 153, 167
Lemming, traces of, i. 251, 275, 276, 328, 330, 338; ii. 28, 39, 328; caught, i. 332, 333, 352

Lewis River, i. 404
Lichens, i. 403
Lichtenfels, i. 29
Lieber, Cape, i. 73, 74; bird-cliffs of, 77; latitude of, ii. 25
Lievely, i. 30
Life-boat Cove, origin of name, i. 6; relics of the Polaris quarters at, 63
Lime-juice pemmican, distastefulness of, i. 309
Lime-juice sledge ration, i. 205
Lincoln Bay, i. 227, 238, 248; condition of English supplies at, 98
Lincoln, Secretary of War, i. 37; ii. 194
Liquids, effects of low temperatures on, i. 188
Littleton Island, ii. 152; cairns examined, i. 63; Nares' relics at, 64; the attempt to reach, ii. 236, 240
Lockwood, Cape, ii. 36
Lockwood Island, the "Farthest North," i. 334–336; view from, 337
Lockwood, Lieutenant James B., referred to, i. 38, 39, 48, 52, 53, 57, 63, 71, 74, 82, 86, 117, 132, 162, 163, 192, 248, 262, 268, 306, 418, 425, 427; ii. 22, 41, 65, 66, 83, 89, 97, 107, 111, 112, 127, 133, 143, 145, 149, 170, 175, 177, 178, 227, 256, 257; expeditions of, to St. Patrick Bay, i. 96; to Bellows Valley, 106; to Cape Beechy, 110; establishes depôt at Cape Baird, 113; trip of, to depôt "B," 147; attempts to reach Cape Beechy, 149; expedition of, to Cape Beechy, 213; to Thank God Harbor, 215; to North Greenland coast, 295; to Archer Fiord, 360, 421; to Ida Bay, 423; sledge-trip of, in Black Rock Vale, ii. 4; to Cape Baird, 14; establishes depôt at Cape Sumner, 17; second expedition of, to North Greenland coast, 18; expedition of, across Grinnell Land, 27; consulted by commanding officer, 115, 122, 128, 137; sent to the relief of Elison, 190; sickness of, 218, 221, 222, 223, 225, 226, 228, 230, 231, 235, 236, 238, 239, 240, 242, 243, 244, 246, 247, 250, 251, 253, 254, 259, 262, 268, 277, 280; death of, 288; character of, 288, 336
Long, Private Francis, referred to, i. 133, 166, 172, 193, 215, 216, 260, 263, 360; ii. 13, 117, 161, 171, 175, 180, 184, 197, 202, 204, 208, 210, 214, 232, 246, 250, 258, 259, 264, 266–268, 271, 275, 277; expedition to Archer Fiord, i. 354; hunting, 422; walrus killed by, ii. 154; hunter, detailed as, 156; expedition of, to Alexandra Harbor, 260, 262, 264; promoted to be sergeant, 290; birthday of, 323
Long-tailed duck, i. 364, 372, 374; fight between, 375
Lookout Hill, i. 179
Looms, i. 49
Lost River, i. 308; cañons of, explored, 306
Louis Napoleon, Cape, reached, ii. 103, 104, 250
Low Point, i. 331
Lowe, Lieutenant, i. 22
Lowe, Mount, i. 315
Lunar, eclipse, i. 167; halo, 167, 186
Lupton, Cape, i. 216
Lynn, Mount, i. 402
Lynn, Sergeant David, referred to, i. 102, 150, 178, 193, 226–228, 238, 295, 306, 320, 366, 377, 388, 391–395, 397, 399, 403, 404, 406, 407, 410–413; ii. 220, 242, 269; reduced to the ranks, 5; trip to Cape Isabella, 187; sickness and death of, 280

Maclure, Sir R., i. 349; ii. 60
Magnetic storm, ii. 8
Magnetic variation, i. 398
Magnetometer, i. 127, 128
Markham, Captain A. H., R.N., i. 14, 257, 335; ii. 23
Markham Island, i. 329
Mary Murray Island, i. 332; records deposited at, 340
Mascart Inlet, i. 329
Matches, failure of, i. 223
May, Cape, i. 251, 323, 325
McClintock, Cape, ii. 100
McClintock, Sir L., i. 136, 202, 237, 293; sledge journeys of, 317
McClintock sledge, i. 198, 298
Medical examinations, i. 146
Melville, Chief Engineer George W., ii. 194, 333
Melville Bay, ii. 335; ice of, i. 58; temperature of water, and soundings, 59
Melville sledge, i. 199
Mer de Glace Agassiz, described, i. 416; ii. 34, 38, 40, 41; floebergs detached from, 55
Mercury, length of time frozen, i. 192, 194, 214; ii. 231, 236, 242, 244
Mercy Bay, i. 349
Mergulus alle, see Auk
Mess troubles, ii. 209, 211
Meteors seen, i. 184; ii. 8, 9
Meyer, Sergeant F., i. 11, 335
Miller Island, i. 259, 262
Minnows seen, i. 116, 374
Mist, above Archer Fiord, i. 402; at Henrietta Nesmith glacier, 405
Mittens, i. 210
Mock-moon seen, i. 121, 186
Mock-suns, seen, i. 120, 272, 341; appear after departure of sun, 157
Mohn, Cape, records deposited at, i. 340
Monodon monoceros, see Narwhal
Moonlight, tests of its power, ii. 9
Moraines, i. 285; ii. 52
Moravian missions, i. 28
Morch, governor at Ritenbenk, i. 47
Morley, Professor E., i. 132
Morton, i. 7
Morton, Cape, i. 94
Moseley, ii. 47
Mosquitoes, i. 116
Moss, Dr., ii. 47, 48
Moss, i. 274, 349, 355; reindeer, i. 364; found, ii. 316; used for food, 321
Mossell Bay, i. 349; ii. 23
Moths, i. 116
Murchison, Cape, depôt "A," i. 102, 193
Musk-ox Bay, i. 93
Musk-ox Valley, i. 268; description of, ii. 32, 39
Musk-oxen, traces of, i. 73, 98, 251, 264, 274–276, 283, 328, 341; ii. 28, 39, 93; seen, i. 104, 108, 279, 291, 370, 371, 373, 375, 376, 381, 386, 387, 391, 392, 395, 396, 407; killed, 80, 81, 82, 84, 104, 105, 358, 360, 362, 417, 418, 422, 423; ii. 4, 7, 25, 33; food and manner of feeding, i. 104, 105; musk-flavor of meat of, how prevented, 185; not migratory, 221; rovings of, 404; calves of, captured, 362; death of, ii. 3, 5; traces of, at Cape Sabine, 328

Nares Fiord, i. 327, 416
Nares Land, i. 341
Nares, Sir George, referred to, i. 137, 159, 162, 179, 184, 202, 218, 244, 245; ii. 23, 47, 98, 122, 125, 186, 260; expedition of, described, i. 13
Narwhals, seen, i. 75, 78; ii. 80, 108; described, 75
Natural history collections, ii. 64, 65
"Neptune," i. 421
Neumayer, Cape, records deposited at, i. 340
Neumayer, Dr., i. 21
Neville, Mount, i. 258, 402

New Herrnhut, i. 29
New Year's Day, how celebrated, i. 177; ii. 11, 218
Newman Bay, i. 215, 219, 221, 225, 296
Nineteenth Century, article from, see Carpenter, W. B.
Nordenskiöld, Baron A. E., referred to, i. 162, 349, 364, 415; ii. 23; explorations of, in Greenland, i. 26; on scurvy, 135, 136
Nordenskiöld Inlet, i. 327, 341
Norsemen, population of settlements of, i. 29; ruins, 30
Northumberland Island, i. 62
North Water, i. 2, 3
Norton Shaw, Cape, reached, ii. 100
Noursuak Peninsula, i. 51
Nyctea scandiaca, see Owl

Observations, scientific, i. 124; assignment of work, 132
Observatory, magnetic, i. 127
Ockerson, J. A., ii. 321 *n.*
Old Sneak (dog), i. 243
Oosuk, see Seal
Orca gladiator, see Sword-fish
Osborn, Admiral Sherard, R.N., i. 136
Outfit of expedition, see Equipment and Supplies
Ovibus, Mount, i. 93; ascended, 122
Owl (snowy), i. 77, 353; ii. 5, 39, 270; egg of, i. 356; food of, ii. 3
Oxyria reniformis, see Sorrel

Pack-ice encountered, ii. 97, 100, 103
Palæocrystic floebergs, i. 71; described, ii. 47, 49, 120; as to the stratification of, 49; diagram of, 50; moraine found in, 53, 117, 120
Palæocrystic floes, i. 74, 214, 217; ii. 28, 96; described, 46; how formed, 47; seen, 75, 78, 80, 83, 93, 105, 120, 127, 145, 148; breaking up of, described, 146
Pancake ice, beset in, ii. 101
"Pandora," i. 60
Pandora Harbor passed, i. 64
Pansch, Dr., i. 26
Papaver nudicaule, see Poppy, Arctic
Paraselenæ, i. 186
Parry Islands, i. 349; ii. 60
Parry, Mount, i. 227; depôt at disturbed by bear, 243
Parry, Sir Edward, i. 4, 103, 202, 335; ii. 49
Patterson, Carlisle, i. 128
Paul, condition of grave of, i. 218
Pavy, Dr. Octave, i. 60, 71, 74, 109, 150, 168, 185, 201, 205, 227, 242, 355; ii. 92, 127, 129, 130, 145, 167, 178, 185, 209, 213, 218, 246-248, 253, 255, 262; joins expedition at Godhavn, i. 47; causes return of Mr. Clay to United States, 84; expedition to Lincoln Bay, 97-100; to Beatrix Bay, 108; to Cape Joseph Henry, 110-112; establishes depôt at The Gap, 227; expedition northward, 238, 242-244, 246-256; on the Eskimo for sledge journeys, 244; contract renewed, 418; expedition to Cape Baird, 424, 426; imprudent conduct of, ii. 2; expedition of, to Carl Ritter Bay, 6, 7; his character, 62; his opposition to the commanding officer, 62, 139; arrest of, for breach of discipline, 66; consulted by commanding officer, 115, 122, 128; mutinous conduct of, 132, 302; abusive to men, 143; sent to the relief of Elison, 190; steals the food of Elison, 207; sickness of, 215, 291, 296, 298, 304, 306; charged with appropriating supplies, 291, 292, 295, 310; delirious, 314, 316; death of, 320

Pavy River, i. 426
Payer Harbor, ii. 162, 268, 277; record cairn made at, 178
Payer, Lieutenant Julius, referred to, i. 18–20, 162, 182, 190, 195, 198, 202, 207, 220, 335
Peabody, George, i. 6
Pendulum observations, i. 130, 131, 180
Pendulum piers, how built, i. 131
Petermann Fiord, i. 416
Petermann's Peak, i. 27
Petersen, grave of, i. 249
Petowik glacier, i. 59
Petrified forest, i. 419
Petrified tree found, i. 194
Phipps, i. 335
Phoca barbata, see Seal, square-flipper
Phoca Groenlandica, see Seal, harp
Phoca hispida, see Seal, fiord
Pierce, Professor, i. 130, 132
Pike, Captain Richard, i. 37, 84
Pine, pieces of, found, i. 376
Pitlekaj, i. 364
Plant-press, patent, abandoned, i. 406
Plectrophanes nivalis, see Snow-bunting
Plover, i. 394; ringed, i. 77
Pocket Bay, i. 332
Point Barrow, ii. 60
Point Barrow Station, i. 23
Polar Conference, see International Polar Conference
Polar Ocean, as to open water in the, i. 349; ii. 22; as to the existence of land in the, 23; ice-pack of the, 253–256
Polar pack, movement of, i. 349; ii. 21, 22
Polar Stations, see International Polar Stations
"Polaris," expedition of, i. 10
Polaris Boat Camp, i. 227, 301
Polaris Promontory, i. 214
Pond Inlet natives, ii. 154
Poppy, Arctic, i. 81, 286, 364, 405
Princess Marie Bay, ii. 265
Procellaria glacialis, see Fulmar
Promontory Point, i. 217
Proteus, description and crew of, i. 37; stopped by the ice, 74, 77; breaking the ice at Discovery Harbor, 83; departure of, 86; expedition learns of the loss of, ii. 162
Protococcus nivalis, i. 59
Proven, i. 52
Prudhoe Land, discovered by Baffin, i. 3
Ptarmigan, killed, i. 111, 279, 315, 342, 353, 376; ii. 159, 161, 267–269, 277–279, 297; seen, i. 122, 277, 313, 330, 340, 346, 397; ii. 5, 28, 37, 258; plumage of, i. 122, 376; traces of, 251, 276, 338; ii. 39, 261, 262
Puppies, first sledge-trip of, i. 353
QUARRELS, ii. 246–248, 251, 254, 255, 302, 310, 313
RADMORE HARBOR, ii. 93
Rae, Dr. John, i. 198, 202; ii. 52
Rain, i. 72, 392, 394, 395, 397, 407
Ralston, Sergeant David C., referred to, i. 39, 103, 132, 166, 295, 302, 306, 314, 316; ii. 86, 110, 197, 232, 251, 292; fingers frozen, 298; struck by sledge, 302; death of, 304–306; character of, 307
Ramsay, Cape, i. 331
Rations on expedition to Farthest North, i. 220; for sledging, see Sledge rations
Raven, killed, ii. 4, 304; seen, 127, 149, 171, 251, 254, 261, 264, 270
"Ravenscraig," i. 12
Rawlings Bay, ii. 93
Rawson, Lieutenant, i. 192, 245
Records, how disposed of, ii. 67; left in abandoned boats, 122
Reindeer, antlers of, found, i. 368, 375, 385; skeleton of, found, ii. 94

Reindeer-moss, i. 376
Relief Squadron, 1884, energy of, ii. 334
Religious services, character of, i. 88
Repulse Harbor, i. 310; Beaumont cairn at, opened, 343
Rescue of survivors, ii. 331
Rest Gorge, i. 313
Retreat, preparations for, ii. 61; the start, 71; means of transportation for the, 75; supplies on the, 76, 110, 134, 156
Reward offered, contingent upon making Farthest North, i. 312
Rice, Sergeant George W., referred to, i. 39, 53, 57, 60, 68, 71, 109, 110, 122, 133, 163, 168, 172, 173, 179, 184, 192, 256, 257, 351; ii. 53, 97, 105, 129, 133, 142, 143, 145, 148, 170, 176, 178, 227, 241, 243, 251, 260, 264, 270, 271, 276, 277, 279; expedition to Lincoln Bay, i. 97; rheumatism and disability of, 99, 100; expedition to Wrangel Bay, 150; injures shoulder, 168; his endurance, 246, 247; expedition of, to Thank God Harbor, ii. 62; as a navigator, 107; consulted by commanding officer, 115, 122, 128; breaks through the ice, 136; trip of, to Cape Sabine, 151, 153; return of, 162; to Cape Isabella, 165; trip to Cape Isabella, 187; attempt of, to reach Littleton Island, 236, 240; trips of, to Bedford Pim Island, 250, 259, 268; trip of, to Baird Inlet, to recover abandoned meat, ii. 281; death of, 286; character of, 288

Rice Strait, ii. 162
Richards, Admiral Sir George, R.N., i. 136
Richardson, Sir John, ii. 314
Richardson Bay, ii. 96; crossing of, 97
Rink, Dr. H., i. 25, 29
Ritenbenk, arrival at, i. 47; garden at, 49; scenery at, 50
Ritenbenk (dog), i. 300, 329, 332, 339
Robeson Channel, i. 215, 251; free of ice, 148
Rocky Gorge, i. 306; described, 307; ii. 32
Rogers, Lake L. H., i. 373
Rome International Meteorological Congress, i. 21
Rosing, U., i. 27
Ross, Sir John, i. 59; voyage of, 4
Rosse Bay, ii. 152, 162, 265, 268, 284; glacier at, 53, 271
Royal Greenland Board of Trade, i. 28
Royal trade monopoly, i. 28, 33
Rubble ice, i. 111, 214, 313; ii. 111, 128, 129, 135, 145; how formed, 45
Ruggles River, explored, i. 271–276, 290; depth of, 381; forded, 407
Rutherford, Cape, ii. 264
Ryan, Private, i. 82; ordered to return with the "Proteus," 84

SABINE, CAPE, i. 66, 69; ii. 268, 277; the move to, 166; caches at, examined, 169, 170; supplies brought from, 178, 179, 181
St. Michael sledge, i. 199
St. Patrick Bay and Valley, i. 96, 97, 423, 425
Salix aretica, see Willow
Salor, Corporal Nicholas, referred to, i. 101, 102, 150, 295, 300, 306, 367, 406; ii. 141, 151, 214, 244, 245, 277, 289, 292; reprimanded, 161; will of, made, 303; death of, 314
Salmon caught, i. 425
Sand-piper, i. 376
Sanderson's Hope, i. 51
Sastrugi, i. 278, 279
Saxifrage, purple (*Saxifraga oppositi-*

folia), i. 81, 191, 273, 282, 286, 363, 364, 370, 371, 403, 405; used for food, ii. 304, 305, 307, 321
School started, i. 162;
Schley, Captain W. S., ii. 331, 333–335
Schley Land, ii. 266
Schneider, Private Roderick R., referred to, i. 174, 176, 234, 246, 353, 417, 418; ii. 141, 143, 145, 153, 184, 196, 230, 232, 243, 245, 248, 251, 277, 293, 296, 297, 308, 315, 323, 325, 327; dogs placed in care of, i. 160; sent to the relief of Elison, ii. 190; appropriates rum, 200; has scurvy, 220; diary recovered, 321 *n.*; extract from diary of, relative to thefts, 321; death of, 328
Schott, Cape C. A., reached, ii. 105
Schott, Charles A., i. 129
Scoresby, i. 26, 335
Scoresby Bay, i. 72; reached, ii. 100
Sculpin, i. 425
Scurvy, ii. 279, 322, 327; comments on, i. 134–136; appears at Camp Clay, ii. 221, 222, 224
Sea-cucumber, ii. 151
Sea-water, freezing experiments with, i. 190
Sea-weed used for food, ii. 312
Seal, traces of, i. 311; ii. 28; killed, 86, 93, 102, 111, 117, 134, 142, 151, 160, 161, 166, 180, 197, 290, 301, 303; seen, 118, 149, 178, 268, 269, 279, 297, 302, 303, 326, 327
Seal, bladder-nose, killed, ii. 139
Seal, fiord, i. 101, 117, 121; seen, 254; ii. 21, 38; killed, 3, 9, 39, 140
Seal, harp, i. 59, 78
Seal, square-flipper, i. 78, 355
Seal-skin, thongs of, used for food, ii. 309, 322, 324
Shadows, deception caused by lack of, i. 192; ii. 131
Sherard Osborn Fiord, i. 316, 416
Sheridan, Cape, i. 312; English flagstaff at, 250
Shrimping-nets, loss of, ii. 324
Shrimps caught, ii. 270, 271, 276, 277, 279, 292, 296, 297, 301, 303, 305, 307, 316, 320, 323, 326
Simmons Bay, ii. 39
Simmons Valley, ii. 39
Skua (gull), i. 364, 371, 376; ii. 3
Sledge journeys on expedition to North Greenland coast, ii. 19
Sledge marches of Beaumont and Lockwood compared, i. 317
Sledges, description of, i. 198, 202; break-down of, 304; ii. 33
Sledging clothing, i. 208–211, 295
Sledging equipment, i. 206, 207, 211, 212
Sledging march and camp, account of, i. 231–234
Sledging ration, i. 202–205; ii. 18
Sleep, regulations as to, i. 142; ii. 2
Sleeping-bags, i. 211
Sludge-ice, beset in, ii. 101
Slush-ice, stopped by, ii. 100
Smith, Inspector Krarup, i. 43, 169; dinner given by his wife, 43; prepares supplies, 52; hospitality of, 55
Smith Sound, variation of the compass in, i. 3; discoveries in, 4, 5; opinion as to polar route by, 350; navigation in, ii. 95; description of, 155, 263, 278; outfit for crossing of, 243
Snipe, i. 372
Snow-bird (bunting), i. 77, 331, 333, 338, 340, 342, 353, 404; ii. 289, 305; seen, 39
Snow-blindness, i. 347
Snow-grotto, i. 346
Snow-shoes, i. 279; used, 341
Snow-storms, ii. 78, 83, 84, 89, 99, 125, 127, 140, 142, 147, 148, 165, 167, 301, 311, 326, 329

Solar halo, i. 120
Somateria mollissima, see Eider-duck
Somateria spectabilis, see King-duck
Sorrel, i. 364, 377
Sound, velocity observations, i. 132
Soundings through ice-crack, i. 324, 342
Spiders, i. 116
Spitzbergen ice-stream, i. 26, 27, 35
Stalknecht Island, ii. 145
Stanton, Cape, ice at, i. 342
Stanton Gorge, English cache, i. 314
Star-fish, i. 73
Starr, Corporal, ordered to return by "Proteus," i. 84
Stearine, candles made from, ii. 232, 235, 248
Stephenson, Captain, R.N., i. 14, 15, 250; cairn of, at Discovery Harbor, 81
Stephenson Island, i. 323, 325–327
Stercorarius longicaudatus, see Skua
Sterna macrura, see Tern
Stevens, Cape, ii. 265, 266
Stony Cape, i. 261
Stores left at Conger, ii. 72
Storms, see Gales
Storm, violent, at Conger, i. 181–183
Strepsilas interpres, see Turnstone
Sugar Loaf, i. 92, 362
Sumner, Cape, i. 215, 216, 219, 225, 301; depôt established at, ii. 17
Sun, last day of, i. 122
Sun Bay, i. 93, 259, 261; English depôt at, 104, 105
Sun Peninsula, ii. 72
Sunday, how observed, i. 87
Svarte Huk, i. 51
Sword-fish, i. 75; described, 77

Tasiusak, i. 54
Tea-leaves, bad effects from eating, ii. 230
"Tegetthoff," voyage of, i. 19, 20, 349; ii. 23
Temperature, highest, i. 386, 387 *n.*
Tern, i. 78, 364, 372, 374, 376
Thank God Harbor, stores at, i. 149, 218; expedition to, 215; English records, 219; snow-storm, with excessive cold, 220; matches fail, 223; Cape Sumner reached, 225; results, 226
Thanksgiving Day, how observed, i. 164; ii. 9; at Camp Clay, 206
Thefts of supplies, ii. 198, 200, 207, 218, 219, 227, 248, 260, 274, 275, 298, 304, 315; extract from diary of Schneider relative to, 321
Thermometers, i. 166; comments on, 124–127
"Thetis," ii. 331
Thirst caused by tobacco, i. 261
"Tialfe," brig, 47
Tidal ice-crack, i. 323, 328, 329, 341, 342, 348
Tidal observations, i. 129; ii. 24
"Tigress," i. 11; ii. 194
Time observations, i. 130
Tobacco, depression caused by discontinuance of, ii. 228
Torsukatak ice-fiord, i. 50
Transportation, means of, on the retreat, ii. 75
Treurenberg Bay, i. 364
Tringa canutus, see Knot
Tripe de Roche used for food, ii. 315, 316, 321
Tromholt, Sophus, i. 184
Turnstone, i. 116, 364, 374, 376, 407; ii. 87
Twin Glacier Valley, ii. 264, 265
Tyson, Cape, i. 94
Tyson, Captain G. E., i. 11

Union, Cape, i. 244, 250, 312
Union Jack of Beaumont recovered, ii. 23; letter of British Minister relative to the return of, 24 *n.*
"United States," voyage of, i. 8–10
United States Mountains, i. 248, 276, 372, 394, 400, 416; ii. 32

Upernivik described, i. 54
Upernivik ice-fiord, i. 30
Ursa grylle, see Dovekie

"Valorous," i. 13
Very River, i. 393
Very Valley, i. 393
Viele, Cape, ii. 264–266
View Point, i. 250, 251
Victoria Fiord, i. 327
Victoria Head, ii. 119 ; sketch of, 114
Victoria Inlet, i. 341, 416
Victoria Range, i. 399 *n.*, 402, 416

Wade Point, ii. 152, 240
Wagon Hill, i. 389
Wahlenburg Bay, i. 364
Waigat Strait, i. 47, 51
Waldo, Professor, i. 125
Walrus, i. 418 ; encounter with, at Littleton Island, 64 ; seen at Cape Hawks, 70 ; heard, 111, 120 ; seen, 120, 128, 130, 131, 149, 151 ; ii. 279, 327, 328 ; killed, 154, 161
Washington, Cape, i. 25, 332, 335, 337
Washington Irving Island, i. 71 ; cairn at, examined, ii. 105
Washington's Birthday, observed, ii. 14 ; at Camp Clay, 252
Water-course Bay, i. 82
Water-course Creek, i. 91
Water for drinking, see Drinking-water
Weyprecht, Lieutenant Charles, explorations of, i. 19 ; plan of, for international polar stations, 21
Weyprecht Fiord, i. 334, 337, 340
Whale (white), i. 75, 77 ; described, 75 ; bone of, found, 422 ; seen, ii. 290, 298, 302, 303
Whale-fisheries of Greenland, i. 26
Whalers, Scotch, assistance from, ii. 335
Whale Sound, i. 3
Whisler, Private William, referred to, i. 108, 110, 119, 193, 195, 260, 269, 273, 274, 277, 279, 280, 282, 292, 295, 298, 302, 367, 406 ; ii. 65, 161, 171, 209, 235, 244, 247, 283, 292, 305, 306, 381 ; birthday celebrated, i. 119 ; ii. 134 ; overcome by cold, i. 168 ; expedition to Archer Fiord, 354 ; sent into Black Rock Vale, 417 ; formal discharge of, ii. 113 ; re-enlists, 116 ; appropriates supplies, 301 ; will of, made, 303 ; death of, ii. 307 ; character of, 309
Whisler, Mount, i. 288, 391, 395, 400
Whymper, i. 120 *n.*, 159
Wilczek, Count, i. 20, 21
Wild, Professor H., i. 21, 23
Wild Fiord, i. 333
Wildes, Commander Frank, ii. 193
Wilkes, Cape, ii. 96
Willow, i. 273, 278, 279, 282, 286, 363 ; used for fuel, 370, 371, 374 ; live, 404
Wind-vane, i. 126
Wind, velocity of, during storm, i. 182
Wolf, i. 105, 122, 157, 191, 262, 264, 276, 283, 290, 323, 352, 370, 371 ; at Conger, 117–119 ; ii. 10 ; tenacity of life of, i. 118 ; encountered, 303
Wolstenholme Island, i. 59 ; ii. 152
Wrangell, Baron, ii. 52
Wrangell Bay, expedition to, i. 150

"Xanthus," i. 61

"Yantic," ii. 162
York, Cape, i. 58, 59
Young ice, i. 95 ; ii. 97, 105, 107-109, 111, 119, 129, 140, 149 ; at Drift Point, 21
Young, Sir Allen, i. 60

Digitized with financial assistance from the
Government of Maharashtra
on 05 October, 2018